GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health

JUNE 1978

VOLUME 12, NO. 6

4286–5066

Volume 12 No. 6

Abstract and Citation Nos. 4286-5066

GASTROENTEROLOGY ABSTRACTS AND CITATIONS

A monthly publication of the
National Institute of Arthritis, Metabolism, and Digestive Diseases

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for the
National Institute of Arthritis, Metabolism, and Digestive Diseases
pursuant to Contract Number NO1-AM-4-2204
with the PHS, USDHEW

DHEW Publication No. (NIH) 79-66

ISSN 0016-5093

PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Subscription price per year in the United States and its possessions: $27.00 (this includes index issue); foreign, $6.75 additional. Single copy price is $1.90 domestic and $2.40 foreign. The index issue is $3.45 domestic and $4.35 foreign. Payment is required in advance, and check or money order should be made payable to the Superintendent of Documents.

NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4286 THE LIGHT AND ELECTRON MICROSCOPIC DISTRIBUTION OF ACID PHOSPHATASE ACTIVITY IN HUMAN NORMAL OESOPHAGEAL EPITHELIUM. (Eng.) Hopwood, D.; Logan, K. R.; Milne, G. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Histochem. J.* 10(2):159-170; 1978.

The fine structural localization of acid phosphatase (AcPase) activity in human normal esophageal epithelium obtained by biopsy was studied with light and electron microscopy to determine whether it conforms to the general cellular pattern reported for other animals, if the membrane-coating granules are AcPase-positive, and if the distribution of activity helps explain the function of the granules in the esophagus. The highest activity was seen in the prickle cell layer merging into the lower functional layer. Electron microscopy revealed activity to be localized in GERL (the specialized region of the endoplasmic reticulum associated with the Golgi apparatus, which shows hydrolase activity that is also present in lysosomes), lysosomes, and membrane-coating granules, which probably secrete their contents into the intercellular space in the central part of the functional layer. AcPase activity is shown to correspond in its distribution to that found in other animal tissues. It is hypothesized that the membrane-coating granules play a role in the freeing of superficial cells for sloughing and the restriction of fluid loss between the cells.

4287 INFLUENCE OF STARVING ON THE RAT GASTRIC MUCOSA: LIGHT AND ELECTRON MICROSCOPICAL FINDINGS. (Eng.) Zaviacic, M.; Brozman, M.; Jakubovsky, J. (Medical Sch., Komensky Univ. Bratislava, Sasinkova 4, 80100 Bratislava, Czechoslovakia). *Exp. Pathol. (Jena)* 14(3/4):122-130; 1977.

The histology and ultrastructure of the rat gastric mucosa were investigated after 24, 48, 72, 144, and 168 hr of starvation. An increased desquamation of individual foveolar cells was found. In the preserved cells of the foveolae, the content of PAS-positive mucosubstances did not change during starvation, and no ultrastructural changes took place in the appearance or in the amount of the mucous granules. The number of lipid droplets increased in the mucous foveolar cells within 24 and 48 hr. During starvation, the mitochondria (mainly in the parietal cells) were enlarged and contained rare mitochondrial cristae. Some mitochondria were disintegrated and removed by lysosomes. The number of lysosomes (mainly cytosegresomes) was markedly increased in the parietal cells. A collapse of the intracellular canaliculi occurred, and the tubulovesicular profiles were narrowed. In chief cells, the profiles of the granular endoplasmic reticulum and Golgi apparatus were reduced. The ultrastructural changes induced by starvation can be interpreted functionally in changed histochemical parameters of the gastric mucosa.

4288 GASTRIC AND DUODENAL MUCOSA IN 'HEALTHY' INDIVIDUALS: AN ENDOSCOPIC AND HISTOPATHOLOGICAL STUDY OF 50 VOLUNTEERS. (Eng.) Kreuning, J.; Bosman, F. T.; Kuiper, G.; Lindeman, J. (Univ. Medical Center, Wassenaarseweg 62, Leiden, Netherlands). *J. Clin. Pathol.* 31(1):69-77; 1978.

To gain information on the variation in appearance of normal gastric and duodenal mucosa, and to determine the density of cellular infiltrate in the lamina propria and the relative numbers of different immunoglobulin-producing plasma cells, biopsy specimens from 50 volunteers without a clinical history of gastrointestinal disease were examined histologically and immunohistochemically. The antrum and fundus were normal in 32 of the 50 subjects, but the other 18 showed histopathological evidence of gastritis in either the antrum or fundus. The latter entity appeared to be age-related: 4, 4, 8, and 2 patients were in the age-groups 20-29, 30-39, 40-49, and 50-59, resp. Moderate to severe atrophy occurred in one patient in the 30-39 age group, four patients in the 40-49 age group, and one patient in the 50-59 age group. There was considerable variation in the appearance of the surface epithelium of the duodenum within and among individual subjects. Superficial gastric metaplasia in one or more biopsy specimens from the duodenal bulb was found in 64% of the individuals. Histopathological examination revealed signs of chronic inflammation in 12% of the subjects. In two cases, there was active inflammation but in only one of these was the diagnosis made on endoscopic appearances. Brunner's glands were found above the muscularis mucosae in 48 subjects, and in only 17 subjects were they present in the descending part of the duodenum. The number of plasma cells in different biopsy specimens from subjects not showing histological signs of inflammation was variable. The ratio IgA:IgG:IgM-producing plasma cells was constant from subject to subject as well as from specimen to specimen. The average ratio IgA:IgG:IgM was 10:2.4:1.1. This study reveals that histological evidence of severe gastritis or severe duodenitis may exist without clinical symptoms. It also shows that the normal duodenal mucosa may show considerable morphological variation.

4289 ACUTE AND CHRONIC EFFECTS OF 1,2 DIMETHYLHYDRAZINE IN MOUSE LARGE BOWEL MUCOSA [Abstract]. (Eng.) Deschner, E. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72(5, Part 2):1048; 1977.

4290 EVIDENCE FOR A NON-SYMMETRICAL ORIENTATION OF VAGAL EFFERENT FIBERS [Abstract]. (Eng.) Innes, D. L.; Martin, J. S.; Lang, I.; Tansy, M. F. (Temple Univ. Health Science Center, Philadelphia, PA 19140). *Fed. Proc.* 36(3):462; 1977.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4291 SCANNING AND TRANSMISSION ELECTRON MICROSCOPIC STUDIES ON THE EFFECTS OF BILE AND ASPIRIN ON THE GASTRIC MUCOSA OF THE RAT [Abstract]. (Eng.) Winborn, W. B.; Guerrero, D. L.; Hodge, E. E. (Univ. Texas Health Science Center at San Antonio, San Antonio, TX). *Gastroenterology* 72(5, Part 2):1168; 1977.

4292 HISTO- AND CYTOCHEMICAL ANALYSES OF THE PHAGOSOMES IN THE MUCOID CELLS OF THE MOUSE STOMACH EPITHELIUM [Abstract]. (Eng.) Sterle, M.; Pipan, N.; Psenicnik, M. (Inst. Human Biology, Ljubljana, Yugoslavia). *Acta Anat. (Basel)* 99(1): 115; 1977.

4293 ENDOCRINE CELLS OF THE STOMACH AND RELATED GROWTHS [Abstract]. (Eng.) Solcia, E.; Capella, C.; Buffa, R.; Frigerio, B.; Usellini, L.; Fontana, P. (Centro di Diagnostica Istopatologica Istochimica ed Ultrastrutturale dell'Universita di Pavia a Varese, Italy). *Rend. Gastroenterol.* 9(1): 58; 1977.

4294 COMBINED HISTOCHEMICAL AND IMMUNOFLUORESCENCE STUDY OF THE INNERVATION OF THE ANTRAL GASTRIN-PRODUCING CELLS IN THE RAT [Abstract]. (Eng.) Lechago, J.; Barajas, L. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA). *Gastroenterology* (5, Part 2):1162; 1977.

See also, 4316, 4328, 4372, 4380, 4430, 4487, 4490, 4495, 4497, 4514, 4524, 4525, 4583, 4588, 4589, 4666, 4709, 4756, 4813, 4926.

ABSORPTION - EXCRETION - TRANSPORT

4295 EXPERIMENTAL STUDIES ON FLUID PATHOPHYSIOLOGY IN SMALL INTESTINAL OBSTRUCTION IN THE RAT. I. EFFECTS OF INTRALUMINAL HYPEROSMOLALITY. (Eng.) Johnson, L.; Nordstrom, H.; Nylander, G. (Karolinska Hosp., 104 01 Stockholm, Sweden). *Scand. J. Gastroenterol.* 13(1):49-56; 1978.

An experimental model was constructed using male albino Sprague-Dawley rats with an extraperitonealized 50-cm loop of the distal ileum to study the transfer of fluids to the intestinal lumen associated with ileus and its relationship to other factors such as parenteral administration of fluids. When 3 ml of a hyperosmolal glucose solution (1,600 mOsm/kg) were introduced into the empty loop, the intestinal mucosa functioned as a semipermeable membrane and permitted only fluids of low osmolality to enter the intestinal lumen, thus tending to normalize its hyperosmolal contents. The initial fluid volume was increased continuously by dilution and had tripled after 1 hr. The process of dilution followed a simple dilution curve. The osmolality of the intestinal fluid decreased rapidly and inversely to the increase in volume, being one-third the original osmolality after 1 hr and one-fourth the original after 2 hr. The intraluminal pressure increased steadily to 35 mm H_2O at the end of the 2-hr experiment, yet the transfer of fluid into the lumen continued for the whole experimental period, indicating increased smooth muscle tone probably due to hyperosmolal provocation. At the same time, hemoconcentration and serum osmolality both increased, reflecting the mobilization of fluids from the extravascular (80% of total mobilized) and vascular compartments. The continued accumulation of fluid in the intestinal lumen at a constant rate conflicts with the idea that pressure has an effect on the amount of fluid that accumulates.

4296 THE RELATIONSHIP BETWEEN VITAMIN D-STIMULATED CALCIUM TRANSPORT AND INTESTINAL CALCIUM-BINDING PROTEIN IN THE CHICKEN. (Eng.) Spencer, R.; Charman, M.; Wilson, P. W.; Lawson, E. M. (Univ. Cambridge and Medical Res. Council, Milton Rd., Cambridge CB4 1XJ, England). *Biochem. J.* 170(1):93-101; 1978.

The rapid stimulation of intestinal Ca^{2+} transport observed in vitamin D-deficient chicks administered 1,25-dihydroxycholecalciferol prompted a re-evaluation of the correlation previously observed between this stimulation and the induction of calcium-binding protein synthesis. By 1 hr after a dose of 125 ng of 1,25-dihydroxycholecalciferol, Ca^{2+} transport was increased. This increase occurred at least 2 hr before calcium-binding protein was detected immunologically and 1 hr before synthesis of the protein began on polyribosomes; thus, the hormone stimulates Ca^{2+} transport before calcium-binding protein biosynthesis is induced. The maximum increase in Ca^{2+} transport observed after this dose of 1,25-dihydroxycholecalciferol (attained by 8 hr) was similar to that observed after 1.25-25 µg of cholecalciferol, but the stimulation was only short-lived, in contrast with the effect observed after the vitamin was given. Later, after hormone administration, when Ca^{2+} transport had declined to its basal rate, the cellular content of calcium-binding protein remained elevated. Calcium-binding protein was synthesized on free rather than on membrane-bound polyribosomes, which implies that it

is an intracellular protein. Rachitic chicks required the presence of dietary calcium for maximum stimulation of calcium-binding protein production by cholecalciferol. These results suggest that calcium-binding protein is an intracellular protein, and that its synthesis may be a consequence of the raised intracellular calcium content of the intestinal epithelial cells resulting from 1,25-dihydroxycholecalciferol-stimulated Ca^{2+} transport. It is proposed that calcium-binding-protein synthesis is necessary for maintaining the stimulated rate of Ca^{2+} transport, which is initiated by other factors.

4297 INTESTINAL TRANSPORT OF WEAK ELECTROLYTES: DETERMINANTS OF INFLUX AT THE LUMINAL SURFACE. (Eng.) Jackson, M. J.; Williamson, A. M.; Dombrowski, W. A.; Garner, D. E. (George Washington Univ. Medical Center, Washington, DC 20037). *J. Gen. Physiol.* 71(3):301-327; 1978.

The possibility that the intestinal transport of weak electrolytes is influenced by a region of distinctive pH at the luminal surface of the epithelial cell layer was examined using intestinal segments from male Wistar rats. The intestinal segments were exposed to various weak electrolytes (15 weak acids and 6 weak bases) in influx chambers. The uptake observed during the 1-min exposure period represented a unidirectional flux that was not complicated by a significant backflux. The determinants of weak electrolyte influx could be described mathematically in terms of the resistance of the unstirred layer to movement from the bulk phase to the cell surface, the degree of ionization of the weak electrolyte at the cell surface, and the cellular permeability to the nonionized weak electrolyte. The unstirred layer was totally rate-limiting in the cases of some poorly ionized or highly permeant compounds but not for most of the compounds studied. The experiments suggest that the pH value that influences weak electrolyte influx into intestinal epithelial cells is equal to the pH in the mucosal fluid bulk phase and do not provide support for the concept of a superficial region of distinctive pH as a significant determinant of weak electrolyte influx.

4298 COMPARATIVE INTESTINAL AND COLONIC ABSORPTION OF [4-^{14}C]CHOLESTEROL IN THE RAT. (Eng.) Roy, T.; Treadwell, C. R.; Vahouny, G. V. (George Washington Univ. Sch. Medicine and Health Sciences, Washington, DC 20037). *Lipids* 13 (1):99-101; 1978.

To determine whether sterols are significantly absorbed by the colon, the absorption of [4-^{14}C]cholesterol was compared in the duodenum and in the cecum of rats. [4-^{14}C]Cholesterol was administered as an aqueous emulsion with triolein and dry non-fat milk either directly into the upper duodenum or into the ileocecal junction of lymph duct cannulated rats. Lymph flow rates were similar in the two groups of animals. Whereas approximately 53% of the administered tracer dose of cholesterol was absorbed when introduced into the upper small intestine, only 0.06% appeared in lymph when administered into the cecum. Furthermore, less than 0.01% of the administered isotope was detected in urine and blood. These data demonstrate that the large intestine does not contribute significantly to the absorption of exogenous cholesterol in the rat.

4299 EFFECT OF ENZYME-INDUCING AND ENZYME-INHIBITING AGENTS ON DRUG ABSORPTION I: 3-O-METHYLGLUCOSE TRANSPORT IN RATS. (Eng.) Ravis, W. R.; Feldman, S. (Dept. Pharmaceutics, Univ. Houston, Houston, TX 77004). *J. Pharm. Sci.* 67(2):245-248; 1978.

The influence of pre-administration of phenobarbital, benzo[*a*]pyrene, or proadifen hydrochloride on 3-*O*-methylglucose transfer across the everted rat small intestine was examined. The active and passive components of the sugar transport mechanism were evaluated using 0.08 mM phlorizin, a potent inhibitor of active transport of sugars. Pretreatment of the animals with phenobarbital (80 mg/kg, i.p. or p.o. for 3 consecutive days) did not alter 3-*O*-methylglucose transfer characteristics. Pretreatment with i.p. administered benzo[*a*]pyrene (20 mg/kg) increased mucosal to serosal transfer of the sugar at low (0.1 mM) sugar concentrations. Enhancement of the active transfer of 3-*O*-methylglucose by pretreatment with proadifen hydrochloride (100 mg/kg, i.p. or p.o.) was noted at low sugar concentrations. The passive transfer of the sugar was reduced after pretreatment with proadifen hydrochloride. The situation in treated animals is complex and requires further study before a conclusion can be reached.

4300 DUAL ACTION OF CHOLERA TOXIN ON ELECTROLYTE AND NON-ELECTROLYTE TRANSPORT IN THE CANINE INTESTINAL MUCOSA [Abstract]. (Eng.) Robinson, J. W. L.; Mirkovitch, V.; Sepulveda, F. V.; Menge, H. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Digestion* 16(1/2):217-218; 1977.

4301 EFFECT OF VARIATIONS IN THE RESISTANCE OF THE UNSTIRRED WATER LAYER ON THE INTESTINAL UNIDIRECTIONAL FLUX OF GLUCOSE IN CONTROL AND ALLOXAN-DIABETIC RATS [Abstract]. (Eng.) Thomson, A. B. R. (Dept. Medicine, Univ. Alberta, Edmonton, Alberta, Canada). *Clin. Res.* 26(2):114A; 1978.

4302 PATHWAYS OF WEAK ACID TRANSPORT IN RAT JEJUNUM [Abstract]. (Eng.) Hatch, W. J. (Texas Coll. Osteopathic Medicine, Denton, TX 76203). *Fed. Proc.* 37(3):697; 1978.

4303 BILE SALT-ENHANCED JEJUNAL MACROMOLECULAR ABSORPTION [Abstract]. (Eng.) Fagundes-Neto, U.; Teichberg, S.; Bayne, M.; Morton, B.; Lifshitz, F. (North Shore Univ. Hosp., Manhasset, NY). *Fed. Proc.* 37(3):699; 1978.

ABSORPTION - EXCRETION - TRANSPORT

4304 TRITIATED GLYCEROL TRIETHER (^{3}H-TGE) AND β-SITOSTEROL (β-S) AS OIL PHASE MARKERS [Abstract]. (Eng.) Cortot, A.; Phillips, S. F.; Malagelada, J. R. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):607A; 1977.

4305 MUCOSAL CALCIUM BINDING PROTEIN (CaBP) IN RAT CECUM AND COLON: EFFECTS OF VITAMIN D DEPLETION (-D) AND REPLETION (+D) [Abstract]. (Eng.) Petith, M. M.; Wilson, H. D.; Schedl, H. P. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Clin. Res.* 25(4):566A; 1977.

4306 INTESTINAL ADAPTATION TO AGE: IN VIVO CECAL AND COLONIC CALCIUM (Ca) FLUX IN THE RAT [Abstract]. (Eng.) Petith, M. M. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Clin. Res.* 25(4):623A; 1977.

See also, 4312, 4371, 4490, 4496, 4716, 4787.

MOTILITY

4307 MANOMETRY AND ELECTROMYOGRAPHY OF THE UPPER ESOPHAGEAL SPHINCTER IN THE OPOSSUM. (Eng.) Asoh, R.; Goyal, R. K. (Univ. Texas Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastroenterology* 74(3):514-520; 1978.

Studies were performed in anesthetized and conscious opossums to define the genesis of resting pressure and opening of the upper esophageal sphincter. Intraluminal pressures were measured with low compliance, perfused catheters. Electromyograms were recorded using miniature concentric bipolar electrodes from the cricopharyngeus, inferior pharyngeal constrictor, middle pharyngeal constrictor, proximal end of the esophagus, and geniohyoid muscles. Upper esophageal sphincter pressure showed radial as well as axial asymmetry; the pressures were higher in conscious than in anesthetized animals. Electromyographically, only the cricopharyngeus and inferior pharyngeal constrictor fired continuously at rest and ceased to fire during swallowing. *d*-Tubocurarine or section of the motor nerve abolished electrical activity in the cricopharyngeus and inferior pharyngeal constrictor and caused marked reduction but not obliteration of upper esophageal sphincter pressure. Contraction of the geniohyoid muscle abolished the remaining pressure in the upper esophageal sphincter. Moreover, contraction of the geniohyoid muscle caused a fall in upper esophageal sphincter pressure, even when the cricopharyngeus and inferior pharyngeal constrictor were kept contracted. These studies indicate that (1) the upper esophageal sphincter corresponds mainly to the cricopharyngeus and inferior pharyngeal constrictor, (2) the resting upper esophageal sphincter pressure is attributable to continuous active muscle contraction as well as to the elasticity of the surrounding structures, and (3) the opening of the upper esophageal sphincter is attributable to the inhibition of the contraction of the cricopharyngeus and inferior pharyngeal constrictor and the forward displacement of the larynx by the geniohyoid muscle.

4308 OESOPHAGEAL PERISTALSIS. A SIMPLE SYSTEM FOR THE RECORDING OF OESOPHAGEAL PERISTALSIS, AND THE INFLUENCE OF BOLUS VOLUME ON PEAK PERISTALTIC PRESSURE AMPLITUDE. (Eng.) Boesby, S.; Sondergaard, E. Y.; Madsen, T. (Odense Sygehus, Sdr. Boulevard 29, DK-5000, Odense C, Denmark). *Scand. J. Gastroenterol.* 13(2):149-153; 1978.

To simplify and improve esophageal pressure recordings and to determine the influence of dry and wet swallows of different bolus volumes on recorded pressure amplitudes, the peak esophageal peristaltic pressure amplitude was recorded in eight healthy subjects at points 5-cm and 15-cm proximal to the gastroesophageal sphincter by using an *in situ* tip-transducer simultaneously with a continuous flush perfused catheter system with external pressure transducer. Dry swallows and wet swallows of 2.5, 5, or 10 ml were made in random succession, three of each at 30-sec intervals. The mean peak esophageal peristaltic pressure amplitudes (in mm Hg) recorded by the *in situ* tip transducer at the 5-cm and 15-cm points, resp., were 34 and 30 (dry swallow), 56 and 45 (2.5-ml bolus), 54 and 49 (5-ml bolus), and 65 and 45 (10-ml bolus). The mean peak pressure amplitudes (in mm Hg) recorded by the perfused catheter at the 5-cm and 15-cm points, resp., were 31 and 26 (dry swallow), 53 and 43 (2.5-ml bolus), 51 and 46 (5-ml bolus), and 55 and 41 (10-ml bolus). In all cases, the pressures recorded by either system correlated well, and the peristaltic pressure amplitude was significantly higher ($p<0.10$) after the wet swallows. In addition, the difference in bolus volumes did not influence the peristaltic pressure amplitude. A possible explanation for the difference between pressures after wet and dry swallows is that, as a result of the distention caused by passage of the bolus, the length-tension characteristics become more optimal for the functioning of the esophageal musculature than is the case after a dry swallow. In conclusion, the simple catheter and flow system used in this study permits recording of peristaltic pressures inde-

pendent of the shape of the transducer, and it is therefore well-suited for measuring esophageal contractions.

4309 EFFECT OF GASTRIC ANTRUM ON REGULATION OF LOWER ESOPHAGEAL SPHINCTER PRESSURE IN THE DOG. (Eng.) Koelz, H. R.; Hollinger, A. P.; Sauberli, H.; Largiader, F.; Siewert, R.; Blum, A. L. (Kantonsspital, Univ. Zurich, Zurich, Switzerland). *Am. J. Physiol.* 234(2):E157-E161; 1978.

The role of the antrum in the regulation of lower esophageal sphincter pressure (LESP) was investigated in three unrestrained dogs equipped with Komarov-type esophagostomy, innervated antral pouch, and gastrojejunostomy. The integrity of the antrum was shown by gastrin release after 20% peptone perfusion of the antrum and after the i.v. injection of insulin (0.4 U/kg). The ability of the lower esophageal sphincter to respond to known stimuli was demonstrated by a dose-dependent rise of LESP after i.v. pentagastrin. Peptone instillation into the main stomach raised LESP from the basal 18.6 ± 1.8 to a maximum of 36.3 ± 2.7 mm Hg but had no effect on serum gastrin. Antral distention with water or 0.1 M $NaHCO_3$, as well as antral perfusion with 0.1 M HCl followed by 0.1 M $NaHCO_3$, perfusion with 0.1 M $NaHCO_3$ followed by 0.1 M HCl, or peptone failed to affect LESP. It is concluded that the antrum and endogenous gastrin have little if any effect on LESP in dogs.

4310 EFFECT OF HISTAMINE AND HISTAMINE ANTAGONISTS ON HUMAN LOWER ESOPHAGEAL SPHINCTER FUNCTION. (Eng.) Kravitz, J. J.; Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 74(2):435-440; 1978.

The effect of histamine phosphate and specific histamine antagonists on human lower esophageal sphincter (LES) pressure was investigated in 31 fasting, healthy subjects. Continuous i.v. infusions of histamine (2.0-40.0 µg/kg/hr) gave graded increases in LES pressure with a peak response of 37.8 ± 4.6 mm Hg at 20.0 µg/kg/hr. The LES response was not altered by diphenhydramine (50 mg, i.v.), but was completely blocked by cimetidine infusion (4.0 mg/kg/hr). Also, p.o. cimetidine (300 mg) antagonized any increase in LES pressure during histamine infusion at a dose shown to give the maximal LES response. Despite this effect of cimetidine in antagonizing the maximal LES response to histamine, p.o. cimetidine at 200, 300, and 400 mg failed to alter basal LES pressure over a 3-hr period. Cimetidine also failed to alter the LES response to i.v. pentagastrin or p.o. beef hydrolysate. These studies suggest that (1) human LES pressure increases in response to i.v. histamine phosphate through its action at an H_2-receptor, (2) the H_1-receptor has no apparent role in the human LES response to histamine, and (3) H_2-antagonism with cimetidine has no effect on the human LES basal pressure or its response to gastrin stimulation.

4311 THE MYOELECTRIC COMPLEX OF THE SMALL INTESTINE AND VARIATIONS OF ALIMENTARY FLOW IN SHEEP. (Fre.) Bueno, L. (Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *C. R. Soc. Biol. (Paris)* 171(4):959-964; 1977.

The variations in the intestinal flow rate of sheep were compared to changes in the electrical activity of intestinal smooth muscle recorded by six groups of electrodes spaced from the antrum to the ileocecal junction while the animals were restrained in metabolic cages. In sheep fed a control diet, myoelectric complexes originated in the duodenal bulb at 70- to 100-min intervals and were propagated along the small intestine at a mean velocity of 21 cm/min. These complexes consisted of irregular activity lasting approximately 56 min followed by 5 min of regular and maximal activity and a resting stage. When the sheep were fasted for 48 hr, the chyme volume dropped from 400 ml/hr to 200 ml/hr, the duration of the irregular phase was reduced to 37 min, the duration of the regular phase increased to 7.5 min, and the velocity of propagation rose to 35 cm/min. In overfed sheep, the chyme volume rose to 520 ml/hr; the irregular phase lasted 84 min, but the regular phase or velocity did not differ significantly from controls. It is concluded that changes in intestinal flow rate are affected by the duration, number, and velocity of propagation of the myoelectric complexes, which propel ingesta through the small intestine.

4312 MOTILITY AND GLUCOSE ABSORPTION IN THE SMALL INTESTINE OF SHEEP. (Fre.) Floramonti, J.; Ruckebusch, M. (Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *C. R. Soc. Biol. (Paris)* 171(4):964-969; 1977.

To examine the relationship between intestinal motility and/or transit and absorption, recurring myoelectric complexes and glucose absorption in the small intestine of three sheep were studied *in vivo* in isolated 2-m jejunal loops, using electrodes and a perfusion marker technique. Glucose was perfused through the jejunal segment at 37.5 mg/min, giving an intestinal flow of 225 ml/hr when the transit of ingesta was interrupted, or 480 ml/hr when the ingesta were allowed to pass normally through the loop. When the intestinal transit was not interrupted, the net absorption of glucose was 30% during the regular activity phase (RAP) and resting phase (RP) of the myoelectric complexes, and it decreased to 10% during the irregular activity phase (IAP), reaching its lowest point 2-6 min before the occurrence of the RAP. When glucose alone flowed through the loop, absorption was maximal during the RP, decreased during the IAP, and became minimal during the RAP. The intestinal flow rate, which was nil during the RP, increased to 8.3 ml/min during the RAP and to 32.4 ml/min during the IAP. These results suggest that, under normal physiological conditions, intestinal absorption occurs mainly during the RAP of myoelectric complexes.

4313 EFFECTS OF ENDOGENOUS PROSTAGLANDIN E ON INTESTINAL MOTILITY. (Eng.) Sanders,

K. M.; Ross, G. (Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 234(2):E204-E208; 1978.

The role of endogenous prostaglandin E (PGE) in the regulation of intestinal motility *in situ* was studied in anesthetized cats. The basal concentration of ileal PGE was found by radioimmunoassay to be 3.3 ± 0.6 ng/wet weight (n=12). Intramesenteric arterial infusion of acetylcholine (ACh, 100 μg/min) increased intestinal motility, and PGE concentration rose to 6.7 ± 0.8 ng/g. The i.v. infusion of indomethacin (4 mg/kg) enhanced spontaneous and ACh-induced motility and abolished the ACh-induced rise in ileal PGE concentration. It is concluded that basal PGE synthesis limits the motility of the resting and ACh-stimulated cat ileum.

4314 FACTORS AFFECTING DELIVERY OF BILE TO THE DUODENUM IN MAN. (Eng.) Ashkin, J. R.; Lyon, D. T.; Shull, S. D.; Wagner, C. I.; Soloway, R. D. (Hosp. Univ. Pennsylvania, 3600 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 74(3): 560-565; 1978.

Studies utilizing balloon occludable T or duodenal tubes in subjects with and without gallbladders were undertaken to identify the contribution of the gallbladder, the sphincter of Oddi, and bile salts to the delivery of bile to the duodenum. Patients with and without a functional sphincter of Oddi and with and without a gallbladder were compared. The presence of a functional sphincter of Oddi in duodenal-tube patients reduced bile salt output by more than 67% from that observed in T-tube patients. When cholecystectomized and normal patients were compared using the duodenal tube, peak bile salt output was significantly increased in normal subjects ($p<0.02$), reflecting gallbladder contraction, but total bile salt output was not significantly increased, suggesting that the gallbladder has a minor role in bile delivery. Exogenous cholecystokinin infusion (0.0625 Crick-Harper-Raper U/kg/min, i.v.) produced much more stable bile secretion than did endogenous release of cholecystokinin by intraduodenal infusion of essential amino acids. This rhythmic release of bile after endogenous cholecystokinin release was related to the concentration of bile salts in the intestinal lumen. Thus, delivery of bile to the duodenum is wave-like and is predominantly controlled by the sphincter of Oddi.

4315 THE EFFECT OF MOTILIN ON THE ELECTRICAL ACTIVITY OF RABBIT CIRCULAR DUODENAL MUSCLE. (Eng.) Riemer, J.; Kolling, K.; Mayer, C. J. (Institut fur Physiologie, Universitat Munchen, Pettenkoferstrasse 8, D-8000 Munchen, W. Germany). *Pfluegers Arch.* 372(2):243-250; 1977.

The effect of 13-norleucine motilin on electrical activity and membrane resistance of the rabbit circular duodenal muscle was studied with intracellular recording techniques. Electrical slow waves without spikes occurred in Krebs solution made twice hypertonic by the addition of sucrose. The slow waves were of the basic organ-specific rhythm (BOR) type. Their mean frequency was 18.1/min, their mean amplitude from trough to peak was 11.4 mV, and their mean membrane potential during the trough was -59.1 mV. Motilin (1×10^{-7} g/ml) caused membrane depolarization by a mean of 10.9 mV. Membrane resistance was reduced. The BOR slow waves were either reduced or abolished by motilin. Slow fluctuations of membrane potential characteristic of a minute-type rhythm (MR) appeared after the addition of the hormone, and trains of spikes occurred at the crests of the MR and were associated with contraction of the muscle. Two mechanisms may account for the correlation between membrane resistance and voltage: (1) motilin may increase conductance for one or more ion species whose equilibration potentials have lower negative values than the resting membrane potential or (2) motilin may induce some unknown mechanism that shifts the potential to lower negative values, constituting a decrease of membrane resistance as a consequence of rectifying properties.

4316 ON THE INFLUENCE OF LOW EXTRACELLULAR CALCIUM LEVEL ON THE CONTRACTILITY AND ULTRASTRUCTURE OF SMOOTH MUSCLE CELLS OF ILEUM AND COLON. (Eng.) Lowe, H.; Bergmann, J. (Akademie der Wissenschaften der DDR, Institut fur Wirkstofforschung, Alfred-Kowalke-Strasse 4, DDR-1136, Berlin, E. Germany). *Exp. Pathol. (Jena)* 14(3/4):180-188; 1977.

The effect of a low extracellular calcium concentration on the contractility and ultrastructure of the smooth muscle cells of the isolated guinea pig ileum and colon was studied. After the calcium level in the organ bath was decreased to one-tenth of the normal concentration, acetylcholine-induced ileal contraction decreased by 50%. The same effect was seen after the addition of 5×10^{-7} M verapamil to normal bath fluid (Tyrode solution). When isolated strips of ileum were incubated in a calcium-free bath for 20 min (37 C), myosin-like filaments were observed in the smooth muscle cells of the tunica muscularis. The same ultrastructural changes were demonstrated when verapamil (2×10^{-5} M) was added to the medium. In contrast, the taenia coli showed no changes in contractility when the calcium level in the organ bath was lowered, and there was no formation of myosin-like filaments. After the addition of verapamil, the contractility of the taenia coli decreased, but not in the same degree as that in the ileum. Ultrastructural changes were not demonstrated in the sarcoplasm of the smooth muscle cells with verapamil. The authors conclude that the contraction of the smooth muscle cells in the ileum is mainly caused by the influx of calcium from the extracellular space. In the taenia coli, however, contraction must be caused by the efflux of calcium from storage sites in the sarcoplasm. The formation of thick myofilaments may be a result of a change in myosin structure following a change in calcium concentration.

4317 ENDOGENOUS PROSTAGLANDIN E AND CONTRACTILE ACTIVITY OF ISOLATED ILEAL SMOOTH MUSCLE. (Eng.) Sanders, K. M. (Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 234(2):E209-E212; 1978.

The effects of endogenous prostaglandin E (PGE) on the contractile activity of isolated cat ileal muscle rings were studied. Force development in circularly oriented muscle fibers was recorded. The muscles contained a mean basal PGE concentration of 1 ± 0.6 ng/g wet weight, as measured by radioimmunoassay. Acetylcholine (ACh) administration or elevated potassium level caused contractions and enhanced PGE concentration ($p<0.05$). The removal of Ca^{2+} from solutions high in potassium blocked contraction, but PGE concentration still increased ($p<0.02$). The prostaglandin synthetase inhibitors, indomethacin and 5,8,11,14-eicosatetranoic acid reduced PGE concentration in muscles (<50 pg PGE/g muscle) and increased the magnitude of contractions induced by either ACh or elevated potassium. Spontaneous contractions were observed in many tissues after inhibition of PGE synthesis. Endogenous PGE limits spontaneous and depolarization-induced muscular activity in cat ileal circular muscle. PGE synthesis was increased by depolarizing stimuli, whether or not contractions were blocked by the removal of external calcium.

4318 QUALITATIVE AND QUANTITATIVE EVALUATION OF INTERNAL ANAL SPHINCTER FUNCTION IN THE NEWBORN. (Eng.) Boston, V. E.; Cywes, S.; Davies, M. R. Q. (Red Cross War Memorial Children's Hosp., Univ. Cape Town, South Africa). *Gut* 18(12): 1036-1044; 1977.

One hundred one normal neonates were examined manometrically in the first day of life to assess anorectal function. To overcome some of the difficulties in subjective interpretation of results, the stimuli used and the response pattern seen in the anal canal were measured. In the unstimulated state, all subjects demonstrated rhythmical changes in anal canal tone. Mean maximal intraluminal pressure in the anal canal decreased significantly after 10 hr of age ($p<0.01$) and after the first meconium stool ($p<0.02$). Only 5 of the 101 examined on the first day of life had an abnormal manometric response. It is significant ($p=0.0194$) that none of these had passed meconium at the time of examination, and that all had a normal response pattern at the age of 28 hr. In 20 babies, the sensitivity of the anorectal reflex was measured and found to be significantly increased ($p<0.01$) on the third day of life compared with the first. The quantitative changes in anorectal reflex function in the newborn are thought to be related to the state of physiological "constipation," which exists *in utero* and in the early neonatal period. The results indicate that a normal response pattern can be obtained in healthy babies after the first day of life. Consequently, anorectal manometry will be meaningful as a diagnostic method thereafter in the neonatal period. It is suggested that measurement of the stimulus and the response will add useful information and reduce subjective error in interpretation of results.

4319 SOMATOSTATIN INHIBITS GASTRIC MOTILITY IN RESPONSE TO DISTENTION. (Eng.) Stadaas, J. O.; Schrumpf, E.; Hanssen, K. F. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(2): 145-148; 1978.

The effect of somatostatin on gastric motility was studied in six healthy volunteers before and after stepwise gastric distention. Distention was performed by filling a flaccid thin-walled bag, which was connected with a low pressure transducer for measuring intragastric pressure variations. Stepwise increase in gastric volume from 0-600 ml caused graded increases in gastric motility. No significant change was seen in the plasma gastrin level. When gastric distention was performed concomitantly with constant infusion of somatostatin (0.05 mg/hr or 0.50 mg/hr) in the same individuals on different days, motility was significantly reduced ($p<0.05$) with both doses of somatostatin, without any changes in the plasma gastrin concentration. It is concluded that somatostatin may have a physiological effect in the regulation of gastric motility. This effect of somatostatin on motility seems to be independent of any effect on the gastrin concentration.

4320 ALPHA-EXCITATORY AND BETA-INHIBITORY ADRENERGIC RECEPTORS IN DUODENAL SMOOTH MUSCLE [Abstract]. (Eng.) Faulk, D. L.; Anuras, S.; Christensen, J. (Univ. Iowa Hosp., Iowa City, IA). *Clin. Res.* 25(4):571A; 1977.

4321 DEPRESSANT EFFECT OF SODIUM NITROPRUSSIDE ON LOWER ESOPHAGEAL SPHINCTER PRESSURE [Abstract]. (Eng.) Dent, J.; Dodds, W.; Hogan, W.; Wood, J.; Arndorfer, R. (Medical Coll. Wisconsin, Milwaukee, WI). *Clin. Res.* 25(4):570A; 1977.

4322 CORRELATION BETWEEN MYOGENIC TENSION AND O_2 CONSUMPTION IN LOWER ESOPHAGEAL SPHINCTER (LES) OF OPOSSUM [Abstract]. (Eng.) Crane, S.; Schulze, K.; Christensen, J.; McKinley, D. (Coll. Medicine, Univ. Iowa, Iowa City, IA). *Clin. Res.* 25(4):570A; 1977.

4323 SOMATOSTATIN (GHRIH) INHIBITION OF HORMONALLY INDUCED INCREASES IN LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP) [Abstract]. (Eng.) Bybee, D. E.; Brown, F. C.; Georges, L. P.; Castell, D. O.; McGuigan, J. E. (Natl. Naval Medical Center, Bethesda, MD). *Clin. Res.* 25(4): 570A; 1977.

4324 THE EFFECT OF L-DOPA ON GASTRIC EMPTYING IN MAN [Abstract]. (Eng.) Berkowitz, D.

M.; McCallum, R. W. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Clin. Res.* 25(4):569A; 1977.

4325 SIMULTANEOUS STUDY OF HUMAN ANTRODUODENAL MOTILITY, GASTRIC EMPTYING AND DUODENO-GASTRIC REFLUX [Abstract]. (Eng.) Rees, W. D. W.; Go, V. L. W.; Malagelada, J. R. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):608A; 1977.

4326 EFFECT OF COFFEE ON HUMAN LOWER OESOPHAGEAL FUNCTION [Abstract]. (Eng.) Fedail, S. S.; Salmon, P. R.; Wurzner, H. P.; Harvey, R. F.; Read, A. E. (Bristol Royal Infirmary, Bristol, England). *Gut* 18(11):A975; 1977.

4327 VARIATION IN RESTING LOWER OESOPHAGEAL SPHINCTER TONE: A NEGLECTED FACTOR AFFECTING RECORDING ACCURACY [Abstract]? (Eng.) Hay, D. J.; Goodall, R. J. R.; Temple, J. G. (Hope Hosp., Manchester, England). *Gut* 18(11):A976; 1977.

4328 EVALUATION OF EXCRETORY FUNCTION OF MAJOR DUODENAL PAPILLA USING RETROGRADE ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY. (Rus.) Semin, M. D. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (6):32-38; 1977.

4329 INFLUENCE OF VARIOUS SULFUR-CONTAINING RADIOPROTECTORS ON GASTRIC EMPTYING IN MICE. (Rus.) Crechka, I. I.; Zherebenko, P. G. (No affiliation given). *Farmakol. Toksikol.* 40(5):595-599; 1977.

4330 EFFECT OF GASTRIN ON ESOPHAGEAL MOTILITY. (Ger.) Eckardt, V. F. (I. Medizinische Universitatsklinik, Johannes Gutenberg-Universitat, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Internist (Berlin)* 18(8):436-443; 1977.

4331 COMPARATIVE STUDY OF GASTRIC MOTILITY AND SECRETION AFTER STIMULATION BY 2-DEOXY-D-GLUCOSE IN DOGS. (Fre.) Boiselle, J. C.; Roze, C.; Vatier, J. (INSERM, U-10, Hopital Bichat, 170 boulevard Ney, F 75877 Paris Cedex 18, France). *Gastroenterol. Clin. Biol.* 1(4):345-352; 1977.

4332 A CRITICAL EVALUATION OF PERFUSION MANOMETRY IN THE LOWER ESOPHAGEAL SPHINCTER. (Ger.) Kunath, U.; Schier, G. (Universitatsklinik, 5300 Bonn-Venusberg, W. Germany). *Z. Gastroenterol.* 15(7):440-447; 1977.

4333 MANOMETRY AND GASTROESOPHAGEAL CLOSURE MECHANISM: AN ATTEMPT AT EVALUATION. (Ger.) Siewert, R.; Wienbeck, M.; Waldeck, F.; Heitmann, P.; Jennewein, H. M.; Blum, A. L. (Klinik und Poliklinik fur Allgemeinchirurgie der Universitat Gottingen, Gosslerstrasse 10, D-3400 Gottingen, W. Germany). *Z. Gastroenterol.* 15(7):431-439; 1977.

4334 X-RAY STUDIES AFTER PLICATION OF THE SMALL INTESTINE: ANIMAL EXPERIMENTS. (Ger.) Schutze, U.; Steinmetz, H.; Schmidt-Gayk, U. (Chirurgischen Zentrums der Univ. Heidelberg, 6900 Heidelberg, W. Germany). *Z. Kinderchir.* 20(4): 307-312; 1977.

4335 EFFECT OF NEUROLEPTOANALGESIA ON THE MOTOR FUNCTION OF THE GASTROINTESTINAL TRACT. (Rus.) Zubkov, V. I.; Verbitskaya, M. A.; Shipkov, V. L.; Groisman, S. D. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (8):48-51; 1977.

4336 "IN VIVO" ELECTRICAL FUNCTION OF THE INTESTINE. (Pol.) Suszczewska-Fischerowa, I. (Klinika Chirurgii Ogolnej i Plastycznej, ul. Banacha la, 02-097 Warszawa, Poland). *Patol. Pol.* 28(2):209-219; 1977.

4337 MECHANISMS OF GASTRIC EMPTYING COMPENSATION DURING PYLORIC SPHINCTER EXCLUSION. (Rus.) Groisman, S. D.; Kharchenko, N. M. (Res. Inst. Physiology, Kiev Univ., Kiev, USSR). *Biull. Eksp. Biol. Med.* 83(6):666-669; 1977.

4338 CALORIC REGULATION OF GASTRIC EMPTYING IN THE RHESUS MONKEY [Abstract]. (Eng.) Moran, T. H.; McHugh, P. R. (Johns Hopkins Medical Sch., Baltimore, MD 21205). *Fed. Proc.* 37(3):227; 1978.

4339 ELECTRICAL AND MOTOR ACTIVITY OF THE SURGICALLY ALTERED GASTRODUODENAL JUNCTION OF THE DOG [Abstract]. (Eng.) Gullikson, G. W.; Okuda, H.; Bass, P. (Univ. Wisconsin, Madison, WI 53706). *Fed. Proc.* 37(3):228; 1978.

4340 A NON-CHOLINERGIC NON-ADRENERGIC INHIBITORY INNERVATION AT THE CANINE PYLORUS [Abstract]. (Eng.) Mir, S. S.; Mason, G. R.; Ormsbee, H. S., III (Univ. Maryland Sch. Medicine, Baltimore, MD 21201). *Fed. Proc.* 37(3):228; 1978.

4341 EFFECT OF SYMPATHETIC NERVE STIMULATION ON ESOPHAGEAL FUNCTION [Abstract]. (Eng.) Fournet, J.; Snape, W. J., Jr.; Cohen, S. (Univ. Pennsylvania, Philadelphia, PA 19104). *Fed. Proc.* 37(3):228; 1978.

4342 INTESTINAL CONTRACTIONS DUE TO HEXAMETHONIUM OR ATROPINE AS EVIDENCE FOR INTRAMURAL INHIBITORY NEURONS [Abstract]. (Eng.) Frank, M. H. (New York Medical Coll., Valhalla, NY 10595). *Fed. Proc.* 37(3):227; 1978.

4343 EXCITATORY ACTION OF SEROTONIN ON SOMAL MEMBRANES OF MYENTERIC NEURONS OF GUINEA PIG SMALL BOWEL [Abstract]. (Eng.) Mayer, C. J.; Wood, J. D. (Dept. Physiology, Univ. Munich, 8 Munich 2, W. Germany). *Fed. Proc.* 37(3):227; 1978.

4344 THE EFFECT OF CASEIN, GELATIN AND GLUCOSE ON GASTRIC EMPTYING [Abstract]. (Eng.) Fisher, M. A.; Burn-Murdock, R. A.; Hunt, J. N. (Guy's Hosp. Medical Sch., London, England). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):483-484; 1977.

See also, 4290, 4304, 4541, 4548, 4583, 4591, 4682.

SECRETION AND METABOLISM

4345 EFFECTS OF K^+ AND ACETYLCHOLINE ON THE OXYGEN UPTAKE IN SUBMANDIBULAR GLAND TISSUES. (Eng.) Komabayashi, T.; Sakamoto, S.; Endoh, S.; Tsuboi, M. (Tokyo Coll. Pharmacy, Tokyo, Japan). *Jikeikai Med. J.* 24(4):281-288; 1977.

4346 INTRACELLULAR DISTRIBUTIONS AND DEVELOPMENTAL CHANGES OF ADENYLATE KINASE ACTIVITY IN SALIVARY GLANDS OF LABORATORY ANIMALS. (Eng.) Doi, N.; Oyama, S.; Tanaka, H.; Furuyama, S. (Nihon Univ. Sch. Dentistry at Matsudo, 2-870-1, Sakaecho-nishi, Matsudo City, Chiba, Japan). *Comp. Biochem. Physiol.* 59B:21-24; 1978.

4347 THE INTERACTION OF LIVER AND KIDNEY IN VITAMIN B_{12} HOMEOSTASIS IN THE RAT [Abstract]. (Eng.) Bullock, J.; Cooksley, G. (Dept. Biochemistry, Univ. Queensland, Brisbane, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):481-482; 1977.

4348 NEURAL REGULATION OF CALCIUM AND AMYLASE OF RAT PAROTID SALIVA. (Eng.) Schneyer, C. A.; Sucanthapree, C.; Schneyer, L. H. (Dept. Physiology, Univ. Alabama in Birmingham, Birmingham, AL 35294). *Proc. Soc. Exp. Biol. Med.* 156(1): 132-135; 1977.

4349 AGE-RELATED CHANGES IN COURSE OF RESTITUTION OF SECRETORY MATERIAL IN RAT SUBMANDIBULAR GLAND STIMULATED WITH ISOPROTERENOL. (Eng.) Mysliwski, A. (Medical Sch., 80-210 Gdansk, Poland). *Exp. Gerontol.* 12(3/4):81-87; 1977.

See also, 4509, 4537, 4538, 4701, 5022.

SECRETION AND METABOLISM

Stomach

4350 PLASMA GASTRIN AND GASTRIC SECRETORY RESPONSE TO DUODENAL PERFUSION WITH LIVER EXTRACT IN HEALTHY HUMAN SUBJECTS. (Eng.) Grabner, P.; Semb, L. S.; Schrumpf, E.; Myren, J. (Diakonhjemmets Hosp., Oslo 3, Norway). *Scand. J. Gastroenterol.* 12(7):865-868; 1977.

The responses of plasma gastrin and gastric secretion were determined in eight healthy subjects during duodenal perfusion with liver extract (LE). After a 1-hr period without perfusion, the duodenum was perfused for 2 hr with 15% LE (pH 4.5-5.5, 1,027 mOsm/kg water) at a rate of 100 ml/hr, either alone or in combination with i.v. infusion of different doses of exogenous pentagastrin (0.1 µg/kg during the first hour, 3 µg/kg during the second hour). Reflux to the stomach was monitored by addition of radioactive B_{12} to the perfusates. During perfusion of the proximal duodenum in six subjects, in whom reflux of the perfusates was less than 4%, only a slight and inconstant change in plasma gastrin was seen. Gastric acid and pepsin outputs were increased to about 18% and 25% of the maximal pentagastrin stimulation, resp. Although 15% LE was shown to release gastrin by antral perfusion, such release was not found by duodenal perfusion, except where reflux to the antrum was seen. The results suggest that intestinal stimulation of gastric secretion exists, but that it is not gastrin dependent.

4351 HEPATIC INACTIVATION OF GASTRINS OF VARIOUS CHAIN LENGTHS IN DOGS. (Eng.) Strunz, U. T.; Thompson, M. R.; Elashoff, J.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 74(3):550-553; 1978.

Acid secretion in response to portal or systemic venous infusion of a series of progressively longer fragments of the carboxyl terminal portion of human gastrin was studied in dogs with gastric fistulae and with transposition of the portal vein and the inferior vena cava. Pentagastrin G6, G7, G8, G9, G10, G13, G17, and G34 were studied. Potency by portal venous infusion relative to systemic venous infusion was used as an index of hepatic inactivation. Fragments with eight or fewer amino acid residues were more than 90% inactivated by hepatic transit. Fragments with nine or more amino acid residues were more resistant to hepatic inactivation than were shorter fragments. For fragments with 7 to 17 amino acid residues, increasing the chain length was accompanied by progressive increase both in hepatic resistance to inactivation and in potency for stimulation of acid secretion, suggesting that resistance to hepatic inactivation may be a major determinant of potency.

4352 THE ROLE OF ADRENALINE AND OF THE VAGUS IN GASTRIN RELEASE AND ACID SECRETION IN DOGS. (Eng.) Brandsborg, O.; Ornshot, J.; Brandsborg, M.; Christensen, N. J. (Kommunehospitalet, DK-8000 Aarhus C, Denmark). *Eur. J. Clin. Invest.* 7(6):481-486; 1977.

To study the role of epinephrine and of the vagus in gastrin release and acid secretion, serum gastrin levels, gastric acid secretion, and plasma epinephrine levels were measured in response to the i.v. injection of 2-deoxy-D-glucose (100 mg/kg) or insulin (0.25 IU/kg) in six dogs with gastric fistulae before and after denervation of the antrum and the intestine (antral-intestinal vagotomy). The same six dogs were also studied pre- and postoperatively in the basal state and after a 200-g beef meal of standard dog food. Serum gastrin levels and gastric acid secretion were also measured in four of the same dogs during the i.v. infusion of epinephrine (2, 4, 6, or 8 μg/min) in doses that produced an elevation of plasma epinephrine to levels occurring during hypoglycemia or after the injection of 2-deoxy-D-glucose. Antral-intestinal vagotomy reduced the basal gastrin concentration slightly and basal gastric acid secretion considerably ($p<0.05$); the rise in serum gastrin in response to 2-deoxy-D-glucose and hypoglycemia was abolished, while the increase in gastric acid secretion was reduced. Beef meal-stimulated gastrin secretion was the same before and after vagotomy. The i.v. infusion of epinephrine had no effect on either serum gastrin concentration or gastric acid secretion. It is concluded that, in the dog, in contrast to man, gastrin release after insulin is dependent on an intact vagus. Gastrin release by epinephrine in the dog does not appear to be physiological since it is not achieved by the amount of epinephrine released in response to hypoglycemia.

4353 ROLE OF GASTRIN HEPTADECAPEPTIDE IN THE ACID SECRETORY RESPONSE TO AMINO ACIDS IN MAN. (Eng.) Feldman, M.; Walsh, J. H.; Wong, H. C.; Richardson, C. T. (Veterans Admin. Hosp., Dallas, TX 75216). *J. Clin. Invest.* 61(2):308-313; 1978.

The relation between gastrin release and acid secretory response was studied in eight healthy subjects. An isotonic mixed amino acid solution (casein hydrolysate) was continuously infused into the stomach of each subject. Acid secretion, measured by *in vivo* intragastric titration, increased 12.8 mEq/hr over the response to intragastric infusion of isotonic saline. Plasma gastrin heptadecapeptide (G-17) concentration, measured by specific radioimmunoassay, increased 13 pM during intragastric amino acid infusion. To determine whether this rise in plasma G-17 concentration could account for some or all of the acid secretory response, several doses of synthetic human G-17-I (4.0, 10.0, 25.0, and 62.5 pmol/kg/hr) were infused i.v. into the same subjects. During this infusion, the stomach was continuously infused with isotonic saline. By graphically relating plasma G-17 concentration during i.v. G-17 infusion to concomitant acid secretion, it was determined that a 13-pM rise in plasma G-17 concentration could increase acid secretion 14.8 mEq/hr. Therefore, the rise in plasma G-17 concentration during intragastric amino acid infusion could have produced all of the observed acid secretory response. This suggests that gastrin heptadecapeptide is the major physiologic mediator of the human acid secretory response to meals containing mixed amino acids.

4354 MACROMOLECULAR SECRETION BY ISOLATED GASTRIC MUCOSA: FUNDAMENTAL DIFFERENCES IN PEPSINOGEN AND INTRINSIC FACTOR SECRETION. (Eng.) Kapadia, C. R.; Donaldson, R. M., Jr. (Veterans Admin. Hosp., West Haven, CT 06516). *Gastroenterology* 74(3):535-539; 1978.

The secretion of pepsinogen and intrinsic factor (IF) in response to various known stimulators and inhibitors of gastric acid secretion was examined in isolated rabbit gastric mucosa maintained in organ culture. Acetylcholine (10^{-8} M) stimulated both pepsinogen ($p<0.01$) and IF ($p<0.01$) secretion, and this stimulation was blocked by atropine (10^{-2} M). Parasympatholytic agents did not alter unstimulated (basal) secretion of pepsinogen even at high concentrations (atropine, 10^{-2} M or propanthelene bromide, 5×10^{-3} M); however, at these concentrations basal IF secretion was abolished. Histamine (10^{-4} and 10^{-2} M) had no effect on pepsinogen secretion but stimulated IF secretion ($p<0.001$). Cimetidine (2×10^{-3} M) reduced both basal and histamine-stimulated IF secretion (by 42%

and 100%, resp.), but pepsinogen secretion remained unaltered. The gastric mucosal surface was not exposed to HCl but was constantly buffered by culture medium at pH 7.4. When 50 mN HCl was applied to the mucosal surface of the biopsies, pepsinogen secretion doubled ($p<0.001$), but IF secretion was abolished. These studies document that fundamental differences exist in the responses of pepsin- and IF-secreting cells and that H^+ ions bathing the mucosal surface of the stomach may influence the results of experiments designed to examine the mechanisms of gastric mucosal macromolecular secretion.

4355 PROTEIN SYNTHESIS INHIBITORS AND GASTRIC ACID SECRETION. (Eng.) Carlisle, K. S.; Reagan, C. R.; Hersey, S. J. (Emory Univ., Atlanta, GA 30322). *Gastroenterology* 74(3):504-510; 1978.

The involvement of *de novo* protein synthesis in acid secretion by the *in vitro* bullfrog gastric mucosa was examined using the inhibitors cycloheximide (5 µg/ml) and puromycin (80 µg/ml). Both inhibitors reduced ^{3}H-leucine incorporation by more than 90%. The inhibition of protein synthesis had no influence on spontaneous acid secretion, nor did it affect secretory stimulation by histamine, carbachol, pentagastrin, or theophylline. Oxygen consumption by nonstimulated and theophylline-stimulated tissues was shown to be independent of protein synthesis. The dramatic morphological changes observed in oxyntic cells during a transition from rest to active secretion persisted in cycloheximide- and puromycin-treated tissues. Stereological analysis of the apical membrane surface area density failed to demonstrate any quantitative influence of protein synthesis inhibition. These studies quantitatively confirm that protein synthesis is not required for the biochemical and morphological events involved in acid secretion by the *in vitro* frog gastric mucosa.

4356 THE ACTIONS OF SECRETAGOGUES ON OXYGEN UPTAKE BY ISOLATED MAMMALIAN PARIETAL CELLS. (Eng.) Soll, A. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *J. Clin. Invest.* 61(2):370-380; 1978.

The action of histamine, carbamylcholine, and gastrin on oxygen uptake by canine fundic mucosal cells was studied *in vitro*. Viable mucosal cells were prepared by exposure of separated mucosa sequentially to collagenase and EDTA. Oxygen consumption, determined by polarography, was chosen as an index of physiological response of mucosal cells to secretagogues. Isobutyl methyl xanthine (IMX), carbamylcholine, histamine, and gastrin each independently stimulated oxygen uptake by the unfractionated mucosal cells. The response to histamine was greatly enhanced when 0.1 mM IMX was present. In fractions of varying parietal cell content obtained with the Beckman elutriator rotor, basal and stimulated oxygen uptake correlated with the parietal cell content of the fractions. The percentage increases in oxygen uptake in response to histamine, gastrin, carbamylcholine, and IMX were similar in enriched fractions with from 50% to 85% parietal cells and in unenriched starting fractions. The normalized dose-response relations for histamine with an IMX background and for carbamylcholine were also similar in these two fractions. The specificity of these responses was tested using metiamide and atropine. Neither metiamide (0.1 mM) nor atropine (10 µM) inhibited basal oxygen uptake. Histamine, studied with an IMX background, was inhibited by metiamide but not by atropine, while carbamylcholine was inhibited by atropine but not by metiamide. Neither metiamide nor atropine inhibited gastrin-stimulated oxygen uptake. These data indicate that in this *in vitro* system, parietal cells account for most of the increase in oxygen uptake produced by exposure to gastric secretagogues and that histamine, gastrin, and carbamylcholine each independently stimulate oxygen uptake by the parietal cell. The specificity displayed by atropine and metiamide in this system suggests that the parietal cell has specific receptors for each of these secretagogues.

4357 THE INTERACTION OF HISTAMINE WITH GASTRIN AND CARBAMYLCHOLINE ON OXYGEN UPTAKE BY ISOLATED MAMMALIAN PARIETAL CELLS. (Eng.) Soll, A. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *J. Clin. Invest.* 61(2):381-389; 1978.

The interactions between histamine and gastrin and between histamine and carbamylcholine and the effects of atropine and metiamide on these interactions were studied, using oxygen uptake as an index of the physiological response of isolated parietal cells. Parietal cells were isolated from canine fundic mucosa by sequential exposure of separated mucosa to collagenase and EDTA. Potentiating interactions between histamine and carbamylcholine and between histamine and gastrin were demonstrated. Against a histamine (0.1 and 1 µM) plus isobutyl methyl xanthine (0.1 mM) background, the dose for 50% response for gastrin was approximately 1 nM, and the maximal response was obtained at 0.1 µM. When added to these combinations of stimulants, metiamide and atropine retained their respective specificities against stimulation by histamine and carbamylcholine, in that responses were inhibited to the level that was seen when the component of the pair that was not inhibited was given alone. The observation that histamine plus gastrin and histamine plus carbamylcholine produce maximal responses that are greater than the maximal response to histamine alone supports the hypothesis that these agents each have direct actions on parietal cells. These observations are not consistent with the hypothesis that histamine is the sole mediator for the effects of other secretagogues. Furthermore, the inhibitory effects of atropine and metiamide on the specific cholinergic and histaminic components of the interactions that occur between secretagogues provide a possible explanation for the apparent lack of specificity of these agents on *in vivo* acid secretion.

4358 HISTAMINE AUGMENTS GASTRIC ULCERATION PRODUCED BY INTRAVENOUS ASPIRIN IN CATS. (Eng.) Hansen, D. G.; Aures, D.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 74(3):540-543; 1978.

Studies were carried out in conscious cats to determine whether the addition of histamine to the i.v. infusion of aspirin would produce more severe ulcers and cause them to appear earlier. A continuous infusion of aspirin (0.063-4.0 mg/kg/hr) for 36 hr did not produce gastric ulcers when given alone but did when combined with histamine-2HCl (160 μg/kg/hr, i.v.). The ulcers were mainly antral in location. The incidence and severity of ulcers increased with duration of the infusion up to 36 hr and with dose of aspirin up to 4 mg/kg/hr. With the highest doses and longest durations, some of the antral ulcers perforated. Antral ulcers occurred in more than half of the cats receiving 0.25 mg/kg/hr or more of aspirin for 36 hr or receiving 4 mg/kg/hr of aspirin for ≥6 hr. Intravenous aspirin plus the intragastric infusion of 150 mM HCl (40 ml/hr) for 16 hr also produced gastric ulcers. Plasma salicylate concentrations were less than 350 μg/ml with all doses and durations of aspirin used (400 μg/ml is regarded as the upper limit of the therapeutic range in man). These studies show that when the stomach is acidified by giving histamine i.v. or HCl intragastrically, i.v. aspirin produces large deep gastric ulcers.

4359 EFFECT OF MAST CELL DEGRANULATION ON GASTRIC MUCOSAL DAMAGE PRODUCED BY SODIUM TAUROCHOLATE IN THE RAT. (Eng.) Rees, W. D. W.; Rhodes, J.; Williams, B. C.; Owen, E.; Newcombe, R. G. (Mayo Clinic, Rochester, MN). *Gastroenterology* 74(3):492-495; 1978.

The source of the histamine released during damage to the gastric mucosa was investigated in rats using perfused total gastric pouches. Two groups of rats were treated with either i.p. normal saline or compound 48/80, an agent that produces mast cell degranulation, over a 5-day period (100 μg on the first day, increasing by daily increments of 100 μg to 500 μg on the fifth day). On the fifth day, total gastric pouches were prepared and connected to a perfusion circuit that enabled a 20-ml volume to be circulated through the pouches. The experiments consisted of three 30-min periods during which transmucosal potential difference was monitored and ionic (hydrogen and sodium) flux was measured; standard acid solution was used in the first two periods and a taurocholate solution in the third. Sodium taurocholate produced a significant increase in ionic flux and fall in the potential difference ($p<0.001$), the magnitude of the changes being similar in the 48/80- and saline-treated groups. Histamine was released from the mucosa in significantly greater amounts ($p<0.001$) during the taurocholate period, and the increase was similar in both groups of rats. Histological examination of the stomachs confirmed mast cell degranulation in the 48/80-treated groups. It is concluded that the histamine released during mucosal damage is probably derived from the "nonmast cell pool" and that this histamine may play a role in mediating the mucosal damage.

4360 EFFECTS OF STRESS AND HIGHLY SELECTIVE VAGOTOMY ON MAST CELLS IN THE WALL OF THE RAT STOMACH. (Fre.) Forgacs, A.; Patricio, J.; Duchatelle, J. P.; Germain, M. (Centre d'experimentation animale, Universite Paris XII, 6, rue du General-Sarrail, 94000 Creteil, France). *J. Chir. (Paris)* 114(3):225-231; 1977.

The effects of immobilization stress and highly selective vagotomy (HSV) on the number and appearance of mast cells of the gastric wall, visualized by Alcian Blue-Safranin staining, were studied in 70 adult male Wistar rats. Group 1 (10 rats) served as control. Group 2 (15 rats) was subjected to 24-hr stress. Group 3 (30 rats) underwent HSV and group 4 (15 rats) was stressed 40 days after HSV. HSV alone caused a significant increase in the mast cell count ($p=0.001$) during the 6-month observation period. Stress caused ulcers in 94.6% of all rats that did not undergo HSV; the overall mast cell count showed no significant change compared with the controls, but the red-staining mast cells disappeared. Stress after HSV caused ulcer in 26.7% of the rats; the total number of mast cells diminished compared with the nonstressed, vagotomized rats (17.9 cells/mm^2 versus 238 cells/mm^2), but the percentage of blue-staining mast cells increased from 41.2% to 86.6%, and the percentage of the red-staining mast cells dropped from 44.4% to 3.9%. The findings indicate that the vagus nerve influences the mast cell count in the gastric wall and regulates the ratio of red-staining to blue-staining mast cells. Stress leads to the disappearance of red-staining mast cells, which may be independent of the vagal innervation. The long-term consequences of HSV should be further studied.

4361 ENDOCRINE CONTROL OF DNA SYNTHESIS IN RAT GASTROINTESTINAL MUCOSA [Abstract]. (Eng.) Enochs, M. R.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2): 1055; 1977.

4362 EFFECTS OF GASTRIN AND VAGOTOMY ON DNA SYNTHESIS IN CANINE FUNDIC MUCOSA [Abstract]. (Eng.) Ryan, G. P.; Copeland, E. M.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1124; 1977.

4363 GASTRIN SECRETORY RESPONSE TO EXOGENOUS AND ENDOGENOUS CYCLIC NUCLEOTIDES IN ANTRAL ORGAN CULTURE [Abstract]. (Eng.) Harty, R. F.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL). *Gastroenterology* 72(5, Part 2):1068; 1977.

4364 A CHRONIC GASTROSTOMY AND TEST SYSTEM FOR EVALUATION OF GASTRIC SECRETIONS IN RHESUS MONKEYS [Abstract]. (Eng.) Houghton, P. W.; Jones, D. C. L. (Life Sciences Div., Stanford Res. Inst., Menlo Park, CA). *Gastroenterology* 72 (5, Part 2):1072; 1977.

4365 THE 2-DEOXY-D-GLUCOSE-NEUTRAL RED TEST AND VAGOTOMY. AN EXPERIMENTAL STUDY. (Eng.) Van Rensburg, L. C. J. (828 Medipark, Foreshore, Cape Town, South Africa). *S. Afr. Med. J.* 52(11):447-450; 1977.

4366 THE ROLE OF MAST CELLS IN THE PATHOGENESIS OF RAT GASTRIC MUCOSAL DAMAGE [Abstract]. (Eng.) Rees, W. D. W.; Rhodes, J.; Owen, E. M. (Univ. Hosp. Wales, Cardiff, Wales). *Gastroenterology* 72(5, Part 2):1118; 1977.

4367 THE EFFECTS OF ACUTE STRESSORS ON THE RELEASE OF GASTRIC MUCUS [Abstract]. (Eng.) Morris, G. P.; Harding, R. K. (Dept. Biology, Queen's Univ., Kingston, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1106; 1977.

4368 PEPSINOGEN SECRETION IN HIBERNATING AND NON-HIBERNATING FROGS--EFFECTS OF SECRETAGOGUE AND cAMP [Abstract]. (Eng.) Goldenberg, D. J.; Simpson, L.; Hirschowitz, B. I. (Div. Gastroenterology, Univ. Alabama in Birmingham, Birmingham, AL 35294). *Gastroenterology* 72(5, Part 2); 1977.

4369 INTRAVENOUS INFUSION OF AMINO ACIDS STIMULATES GASTRIC ACID SECRETION IN MAN [Abstract]. (Eng.) Isenberg, J. I.; Maxwell, V. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1074; 1977.

4370 INHIBITION OF GASTRIC H-ION SECRETION IN DOG AND MAN BY A LOCAL ANESTHETIC USV 64-105 [Abstract]. (Eng.) Romano, D.; Cervoni, P.; Muslim, A.; Plansky, R.; Pellecchia, C.; Berkowitz, J. M. (Res. Lab., USV-Pharmaceutical, Tuckahoe, NY). *Gastroenterology* 72(5, Part 2):1122; 1977.

4371 EFFECT OF ASPIRIN ON GASTRIC ELECTRICAL POTENTIAL IN RAT [Abstract]. (Eng.) Mann, N. S.; Kadian, R. S.; Borkar, B.; Narenderan, K. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1097; 1977.

4372 EFFECT OF GLUCAGON ON ASPIRIN-INDUCED GASTRIC MUCOSAL DAMAGE IN MAN [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J.; Krause, W.; Baskin, W. N. (Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(3):276A; 1977.

4373 COMPARATIVE EFFECTS OF D-PENICILLAMINE, ASPIRIN, KETOPROFEN AND IBUPROFEN ON GASTRIC MUCOSA [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1094; 1977.

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4375 ANTIULCER EFFECT OF ASPIRIN [Abstract]. (Eng.) Robert, A.; Hanchar, A. J.; Lancaster, C.; Nezamis, J. E. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1120; 1977.

4376 ACUTE EROSIVE GASTRITIS INDUCED BY L-DOPA: ITS PREVENTION BY MYLANTA II, METIAMIDE AND CIMETIDINE [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1094; 1977.

4377 THE EFFECT OF CARBACHOL, DOPAMINE, AND ATROPINE ON GASTRIN SECRETION BY ANTRAL MUCOSA IN ORGAN CULTURE [Abstract]. (Eng.) Harty, R. F.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL). *Gastroenterology* 72(5, Part 2):1068; 1977.

4378 CIMETIDINE AND SALBUTAMOL COMBINED INHIBITION OF GASTRIC ACID [Abstract]. (Eng.) McCloy, R. F.; Parmenter, S. C.; Baron, J. H. (Royal Postgraduate Medical Sch., Hammersmith Hosp., London, England). *Gut* 18(5):A404-A405; 1977.

4379 EFFECTS OF CIMETIDINE, A HISTAMINE H_2-RECEPTOR ANTAGONIST, ON VARIOUS EXPERIMENTAL GASTRIC AND DUODENAL ULCERS. (Eng.) Okabe, S.; Takeuchi, K.; Urushidani, T.; Takagi, K. (Kyoto Coll. Pharmacy, 5 Goryo-Nakauchi, Yamashina, Kyoto 607, Japan). *Am. J. Dig. Dis.* 22(8):677-684; 1977.

4380 CIMETIDINE AND PROSTAGLANDINS: EVIDENCE FOR DIFFERENT MODES OF ACTION ON THE GASTRIC MUCOSA [Abstract]. (Eng.) Carmichael, H. A.; Nelson, L. M.; Russell, R. I. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A404; 1977.

4381 INHIBITORY EFFECT OF CYCLOHEXIMIDE ON GASTRIC SECRETION IN RATS. (Eng.) Korbova, L.; Kohout, J.; Cizkova, J.; Cihak, A. (First Surgery Clinic, Charles Univ., Prague 2, Czechoslovakia). *Biochem. Pharmacol.* 26(10):979-981; 1977.

4382 AGGRAVATION OF CYSTEAMINE-INDUCED DUODENAL ULCERS BY BILE DUCT LIGATION [Abstract].

(Eng.) Robert, A.; Nezamis, J. E.; Lancaster, C. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1121; 1977.

4383 GLUCOSE-INDUCED SUPPRESSION OF MEAL-STIMULATED GASTRIN RELEASE IN DOGS: RELATION TO GASTRIC INHIBITORY POPYPEPTIDE (GIP) [Abstract]. (Eng.) Baumert, J.; Cataland, S.; Tetirick, C.; Pace, W.; Mazzaferri, E. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Clin. Res.* 25(3):306A; 1977.

4384 THE EFFECT OF TWO INHIBITORS OF HISTIDINE DECARBOXYLASE ON GASTRIC SECRETION IN THE RAT. (Eng.) Megazzini, P.; Bacciarelli, C. (Istituto Farmacobiologico Malesci, Via Paisiello 8, Firenze, Italy). *Drug. Res.* 27(I, 3):620-623; 1977.

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4386 HISTAMINE H-2 STIMULATION AND INHIBITION OF PEPSIN SECRETION IN THE FISTULA DOG [Abstract]. (Eng.) Hirschowitz, B. I.; Hutchison, G. (Univ. Alabama Medical Sch., Birmingham, AL 35294). *Gastroenterology* 72(5, Part 2):1069; 1977.

4387 ARTERIOLAR HISTAMINE RECEPTORS IN THE CORPUS AND ANTRUM BEHAVE DIFFERENTLY [Abstract]. (Eng.) Guth, P. H.; Smith, E. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1067; 1977.

4388 REGULATION OF THE NON-MAST CELL HISTAMINE LEVEL WITH SPECIAL REFERENCE TO THE GASTRIC HISTAMINE [Abstract]. (Eng.) Huszti, Z. (Res. Inst. Pharmaceutical Chemistry, Budapest, Hungary). *Agents Actions* 71(1):113; 1977.

4389 EFFECT OF HISTAMINE, PENTAGASTRIN, URECHOLINE AND THEOPHYLLINE ON CANINE GASTRIC MUCOSAL CYCLIC NUCLEOTIDES [Abstract]. (Eng.) Levine, R. A.; Schwartzel, E. H., Jr.; Bachman, S. (SUNY, Upstate Medical Center, Syracuse, NY). *Gastroenterology* 72(5, Part 2):1089; 1977.

4390 GASTRIC CYTOPROTECTIVE PROPERTY OF PROSTAGLANDINS [Abstract]. (Eng.) Robert, A.; Nezamis. J. E.; Lancaster, C.; Hanchar, A. J. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1121; 1977.

4391 EFFECT OF E_2 PROSTAGLANDINS ON CANINE NON-PARIETAL CELL SECRETION [Abstract]. (Eng.) Bolton, J. P.; Cohen, M. M. (Dept. Surgery, Univ. British Columbia, Vancouver, British Columbia, Canada). *Gastroenterology* 72(5, Part 2):1031; 1977.

4392 STIMULATION OF ANTRAL GASTRIN RELEASE AND GASTRIC ACID SECRETION BY TAUROCHOLIC ACID [Abstract]. (Eng.) McGuigan, J. E.; Sekine, T.; Woodward, E. R. (Univ. Florida Coll. Medicine, Gainesville, FL). *Gastroenterology* 72(5, Part 2): 1100; 1977.

4393 SERIAL pH CHANGES IN THE PROXIMAL DUODENUM DURING SMOKING (S) [Abstract]. (Eng.) Murthy, S. N. S.; Dinoso, V. P.; Clearfield, H. R. (Hahnemann Medical Coll., Philadelphia, PA 19102). *Gastroenterology* 72(5, Part 2):1106; 1977.

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4398 MUCOSAL ATP CONTENT DURING ACUTE MUCOSAL ULCEROGENESIS [Abstract]. (Eng.) Ritchie,

W. P., Jr.; Schneider, J.; Shearburn, E. W., III (Univ. Virginia Medical Center, Charlottesville, VA 22901). *Gastroenterology* 72(5, Part 2):1120; 1977.

4399 TROPHIC EFFECTS OF CHRONIC HYPERGASTRINEMIA IN THE RAT [Abstract]. (Eng.) Deveney, C. W.; Deveney, K. S.; Reber, H. A.; Way, L. W. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1048; 1977.

4400 GIANT HYPERTROPHIC GASTRITIS OF BASENJI DOGS. (Eng.) Van Kruiningen, H. J. (Dept. Pathobiology, Univ. Connecticut, Storrs, CT 06268). *Vet. Pathol.* 14(1):19-28; 1977.

See also, 4287, 4288, 4292, 4293, 4294, 4329, 4331, 4415, 4501, 4529, 4538, 4541, 4553, 4597, 4662, 4665, 4666, 4671, 4673, 4675, 4678, 4679, 4680, 4689, 4693, 4694, 4695, 4696, 4697, 5036.

SECRETION AND METABOLISM

Pancreas

4401 STUDIES ON THE SECRETORY PROCESS IN EXOCRINE PANCREAS CELLS II. C57 BLACK AND BEIGE MICE. (Eng.) Novikoff, A. B.; Quintana, N.; Mori, M. (Albert Einstein Coll. Medicine, Yeshiva Univ., Bronx, NY). *J. Histochem. Cytochem.* 26(2): 83-93; 1978.

Electron microscopic and cytochemical studies were performed on the pancreas of the C57 black mouse and its beige mutant (an animal homologue of the Chediak-Higashi syndrome) to determine whether the packaging of secretory materials occurs in GERL, an area of endoplasmic reticulum (ER) that displays acid phosphatase (AcPase) but not thiamine pyrophosphatase (TPPase) activity and from which lysosomes appear to form. In the black mouse, electron microscopy revealed that the GERL includes condensing vacuoles, coated vesicles, and rigid lamellae. The rough ER extends to GERL through gaps between Golgi stacks. Electron-opaque materials were not encountered, either in GERL or in other areas of ER. In the beige mouse, electron microscopy demonstrated that most of the GERL appears to consist of wide dilated portions filled with electron-opaque materials that seem to be packaged into huge residual body-type lysosomes. This GERL also showed AcPase-positive condensing vacuoles, rigid lamellae, and coated vesicles. In the beige mouse, therefore, processing and packaging of secretory materials apparently continue normally despite the formation of abnormal granules of GERL. The studies reported here establish that GERL can be specialized into different regions in the pancreatic acinar cell and extend the concept of the complexity of transport within the ER.

4402 CHANGES IN PANCREATIC AND INTESTINAL ENZYME ACTIVITIES FOLLOWING CHENODEOXYCHOLIC ACID FEEDING. (Eng.) O'Donnell, M. D.; Fitzgerald, O.; McGeeney, K. F. (Dept. Medicine and Therapeutics, Univ. Coll., "Woodview," Stillogran Rd., Dublin 4, Ireland). *Scand. J. Gastroenterol.* 12(6): 683-687; 1977.

The effect of p.o. chenodeoxycholic acid (CDCA) on pancreatic and intestinal enzyme levels was examined by feeding 0.5% CDCA in a normal diet to male mice (inbred bca strain). Groups of eight mice each were killed on days 3, 23, and 70 after the start of CDCA feeding. Pancreatic lipase concentration and specific activity were significantly increased after 3 days and 70 days ($p<0.0005$ and $p<0.01$) on the CDCA-containing diet but not at 23 days. Amylase and trypsin activities per gram of pancreas were significantly higher at 23 days ($p<0.05$ for both) and 70 days ($p<0.01$ and $p<0.05$, resp.) on the diet compared to controls. Expressed as specific activities (U/mg protein) the difference between the experimental and control groups is significant only at 70 days ($p<0.025$) with respect to amylase and is not significant with respect to trypsin. Pancreatic protein concentration was significantly increased at 3 and at 70 days ($p<0.005$ and $p<0.01$, resp.) but not at 23 days compared to controls; the intestinal protein concentration was significantly higher only after 70 days ($p<0.05$). Intestinal amylase levels did not change during the experiments. Intestinal α-glucosidase activity was significantly increased after 3 days, expressed either as concentration ($p<0.0005$) or as specific activity ($p<0.0025$). However, at 70 days on the CDCA-containing diet, the difference was significant ($p<0.02$) only when expressed as a concentration; the difference was never significant when expressed as a specific activity. The increase in the digestive enzyme concentration of the pancreas caused by CDCA feeding is somewhat similar to the effect of feeding soybean trypsin inhibitors. The higher enzyme levels may result from increased synthesis, probably leading to increased secretion of enzymes.

4403 THE ACTION OF BOMBESIN AND LITORIN ON PANCREATIC SECRETION OF THE RAT. (Eng.) Linari, G.; Linari, M. B.; Lutoslawska, G. (Istituto di Farmacologia Medica I, Piazzale delle Scienze 5, 00185 Roma, Italy). *Rend. Gastroenterol.* 9(3):179-184; 1977.

The effects of bombesin (BBS) and litorin (LIT) on pancreatic secretion were investigated in anesthesized female Wistar rats and compared with the effect of cerulein (C). Both BBS and LIT strongly stimulated pancreatic flow and amylase output in a dose-dependent manner, with a short latency in the onset of the response. With regard to amylase secretion the threshold dose was 5-10 ng/kg/min for BBS and 15-20 ng/kg/min for LIT. The maximum response of both BBS and LIT was observed at an infusion rate of 303.75 ng/kg/min. Similar responses were obtained with C infused at rates 10 times lower on a weight basis. The calculated maximal responses of amylase output to bombesin and litorin were similar but, on the basis of ED_{50}, bombesin was 36% more potent than LIT. There was a statistically significant correlation (r=0.96) between pancreatic flow and amylase secretion, indicating that no change in amylase concentration occurred during stimulation with either polypeptide. Pancreatic secretion elicited by BBS, LIT, or C was practically unaffected either by atropine administration or by enterectomy. The latter finding makes it unlikely that BBS and LIT act on the rat pancreas through cholecystokinin (CCK) release, unless CCK is released by sites other than the intestine. It is suggested that the effect of BBS and LIT on the rat pancreas is due primarily to direct stimulation of the acinar cell.

4404 THE ACTION OF CAERULEIN ON THE PANCREATIC SECRETION OF THE RAT. (Eng.) Linari, G.; Linari, M. B. (Inst. Medical Pharmacol. I, Univ. Rome, 00185 Rome, Italy). *Farmaco [Prat.]* 32(12): 611-616; 1977.

The response of the pancreas to i.v. cerulein was studied in female Wistar rats. Cerulein stimulated both juice flow and amylase output. A good dose-response relationship was obtained for infusion rates of the peptide ranging from 1.25 to 33.75 ng/kg/min. At the rate of 101.25 ng/kg/min, the pancreatic response decreased. The rate of amylase output rapidly increased to 3.75 ng/kg/min, remaining constant thereafter. Atropine (5 mg/kg, 10 min before cerulein; or 30 µg/kg/min, starting 30 min after cerulein infusion) did not appreciably affect the pancreatic response. This study confirms that cerulein is a potent stimulant of pancreatic secretion in the rat.

4405 PANCREATIC ACINAR CELL CHANGES INDUCED BY CAERULEIN, VINBLASTINE, DEUTERIUM OXIDE, AND CYTOCHALASIN B IN VITRO. (Eng.) Stock, C.; Launay, J. F.; Grenier, J. F.; Bauduin, H. (Unite de Recherches 61 de l'INSERM, Avenue Moliere, 67200 Strasbourg, France). *Lab. Invest.* 38(2):157-164; 1978.

To elucidate the possible role of microfilaments and microtubules in secretory processes, the effects of cerulein, vinblastine (VB), deuterium oxide (D_2O), and cytochalasin B upon both the structure and the function of the pancreatic acinar cell were studied *in vitro* using rat pancreatic fragments. Cerulein (10 ng/ml) stimulated the release of enzymes and induced the appearance of numerous exocytotic images at the apical part of the acinar cell. Whereas VB (5×10^{-5} M) and D_2O (55%) inhibited the secretory response to cerulein, they did not affect the general ultrastructure of the acinar cell. Prolonged incubation in the presence of VB provoked the disappearance of microtubules and the massive precipitation of microcrystalline material in all parts of the cytoplasmic space. Numerous microtubules were found in the acinar cell after exposure to D_2O. Although VB and D_2O did not alter the microfilamentous network localized at the apical part of the cell, cytochalasin B (2×10^{-5} M) disrupted it. This drug decreased the number of microvilli projecting into the enlarged acinar lumen. Whether cytochalasin B was used alone or in association with VB or D_2O, it inhibited the secretory response to cerulein and prevented exocytosis. It is suggested that microfilaments act in a later step of the secretory cycle, i.e., exocytosis, than do microtubules.

4406 ENZYME SPECTRUM OF THE EXOCRINE PANCREAS OF VARIOUS SPECIES AND ITS SIGNIFICANCE IN ENZYME SUBSTITUTION THERAPY. (Ger.) Berndt, W.; Maas, R.; Strassner, A. (I. Medizinische Universitatsklinik, Martinistrasse 52, 2000 Hamburg 20, W. Germany). *Therapiewoche* 27(35):6090, 6092, 6095-6098, 6101-6104, 6107; 1977.

The enzyme pattern of the exocrine pancreas of the hog, cattle, sheep, horse, and pike, and the suitability of these enzymes in human enzyme substitution therapy were studied. Considerable species-specific differences were found in the lipase, amylase, trypsin, and chymotrypsin in levels of the pancreas, especially with respect to lipase and amylase. The enzyme pattern of the porcine pancreas, featuring high lipase and amylase levels, was found most similar to that of the human pancreatic juice. Lyophilized porcine pancreatin was found best for enzyme substitution therapy in maldigestion syndrome. The porcine exocrine pancreas enzymes were also similar to the human pancreatic enzymes in terms of their molecular properties (molecular weight, isoelectric point, amino acid composition, and trypsin inhibition by Trasylol, Ovumucoid, and Kunitz pancreas trypsin inhibitor).

4407 IMMUNOCHEMICAL QUANTITATION OF PANCREATIC ENDOPEPTIDASES IN THE INTESTINAL CONTENTS OF GERMFREE AND CONVENTIONAL RATS. (Eng.) Genell, S.; Gustafsson, B. E.; Ohlsson, K. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 12(7):811-820; 1977.

Immunochemical techniques were developed and applied to study the fate of pancreatic endopeptidases in the intestinal canal of conventional and germfree Swedish AGUS-strain rats. Two electrophoretically distinct trypsins and chymotrypsins and an elastase were isolated from Sprague-Dawley rat pancreatic juice and rabbit antisera against these enzymes used in the immunochemical studies. In both types

of rat, an anionic trypsin and chymotrypsin were the most abundant and were found in higher concentrations in the distal (trypsin, ≈700 μg/g intestinal contents and ≈1,000 μg/g; chymotrypsin, ≈700 and ≈1,800 μg/g for germfree and conventional rats, resp.) than the proximal small intestine (trypsin, ≈200 μg/g and chymotrypsin, ≈450 μg/g for both conventional and germfree rats). The cecal and fecal concentrations of anionic trypsin were markedly higher in the germfree (≈400 and ≈500 μg/g, resp.) than the conventional rat (<100 μg/g for both). Chymotrypsin was not detected in the large intestine of either type of rat. Immunoreactive elastase concentrations were significantly higher in the distal small intestine than in the proximal small intestine in both conventional and germfree rats. In germfree rats, immunoreactive elastase was higher in the cecum (≈2,000 μg/g intestinal contents) and feces (≈2,200 μg/g) than in the distal small intestine (≈1,400 μg/g). No elastase was demonstrated in the large intestine of conventional rats. The immunoreactive anionic trypsin and elastase in the fecal extracts were of the same molecular size as the native enzymes. These results suggest that the intestinal microflora is important in the degradation of elastase and trypsin, while nonbacterial mechanisms may play a similar role for chymotrypsin.

4408 EFFECT OF GLUCAGON ON CANINE EXOCRINE PANCREATIC SECRETION STIMULATED BY A TEST MEAL. (Eng.) Singer, M. V.; Tiscornia, O. M.; Mendes de Oliveiro, J. P.; Demol, P.; Levesque, D.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM, 46, Chemin de la Gaye, 13009, Marseille, France). *Can. J. Physiol. Pharmacol.* 56(1):1-6; 1978.

The effect of glucagon on exocrine pancreatic secretion by a test meal was studied in three dogs with a chronic gastric fistula and a modified Thomas duodenal fistula. Glucagon was given by continuous i.v. infusion (5, 10, 15, or 30 μg/kg/hr) before and during a test meal. At each dose level, glucagon significantly reduced the water and electrolyte secretion of the pancreas ($p<0.05$ or $p<0.02$). At 15 and 30 μg/kg/hr, glucagon inhibited protein output (by 70% and 45%, resp.); this effect was absent at lower doses. These findings demonstrate a dose-dependent inhibition by glucagon of the pancreatic bicarbonate and protein response to a meal. Inhibition of bicarbonate output was more sensitive to glucagon than was protein output.

4409 A CONTROLLED TRIAL OF GLUCAGON IN ACUTE EXPERIMENTAL PANCREATITIS IN RATS. (Eng.) Durr, H. K.; Weihe, W.; Bode, C.; Bode, J. C. (Medizinische Klinik der Philipps Universitat, Mannkopffstr. 1, D-3550 Marburg/Lahn, W. Germany). *Z. Gastroenterol.* 15(12):728-733; 1977.

The usefulness of glucagon in the treatment of acute pancreatitis was studied in 245 rats in which pancreatitis had been induced by retrograde instillation of Na-taurocholate into the pancreatic duct. The mortality rate in animals treated every 6 hr with glucagon (1 mg/kg) after the induction of pancreatitis was 50% as compared to 30% in the controls treated with 0.9% NaCl ($p<0.05$). The mortality rate in animals treated every 6 hr with the same dose of glucagon before the induction of pancreatitis was 36.5% as compared to 28% in the corresponding controls ($p>0.05$). Glucagon in lower doses (0.1-0.5 mg/kg/6 hr) did not alter mortality rates, as compared with animals treated with 0.9% NaCl. A nonlethal form of pancreatitis was induced in 26 rats by pancreatic duct ligation. The injection of glucagon (1 mg/kg) seemed to suppress amylase activities in blood for approximately 1 hr. However, 7 and 9 hr after the induction of pancreatitis, amylase activities were significantly higher in animals treated one or two times with glucagon as compared with those in untreated controls ($p<0.01$ or <0.001). It is concluded that glucagon in the high dose of 1-4 mg/kg/24 hr is useful in the treatment of acute pancreatitis in rats.

4410 FAT NECROSIS--A CAUSE OF PANCREATIC PARENCHYMAL NECROSIS? (Eng.) Schmidt, H.; Lankisch, P. G. (Medizinische Klinik II, Schwalbacher Str. 62, D-6200 Wiesbaden, W. Germany). *Digestion* 17(1):84-91; 1978.

The pancreatic duct or the interstitial tissue of 34 male Sprague-Dawley rats were injected with 0.35 ml of a triglyceride or a product of lipolysis, namely, oleic acid (13 animals), olive oil (9), mono-olein (6), or paraffin oil (6) to test the effects of substances that are released by necrotic fat cells on the pancreatic parenchyma. The animals were killed 6 or 24 hr later, and the pancreas was removed and fixed for histological examination. Acute pancreatic necrosis with severe edema resulted in 6 hr when oleic acid was injected into the pancreatic duct. Similar, but somewhat less pronounced alterations, were produced by olive oil treatment. After injection of oleic acid into the pancreatic interstitial tissue, coagulation-type necrosis of acinar tissue developed after 6 hr adjacent to these droplets, and within 24 hr the necroses had extended into the acinar parenchyma. Again, olive oil treatment produced a similar result of lesser extent. Mono-olein or paraffin oil caused no histological alterations of acinar cells. It is concluded that the olive oil-induced pancreatic necrosis results from the detergent effect of fatty acids, which are locally accumulated during lipolysis of injected triglycerides by pancreatic lipase, and that may destroy cellular membranes by their high surface activity. The fatty acids split off in fat necrosis during acute pancreatitis may also damage adjacent pancreatic acinar tissue.

4411 REGULATION OF RAT EXOCRINE PANCREATIC SECRETION BY BILE [Abstract]. (Eng.) Staub, J. L.; Sarles, H. (INSERM Unite 31, 46 chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):48; 1977.

4412 INHIBITION OF PANCREATIC PROTEIN SECRETION BY INTRADUODENAL INFUSION OF FATTY ACIDS IN CONSCIOUS RATS: ANTI-CCK FACTOR [Abstract]. (Eng.) Demol, P.; Sarles, H. (INSERM U 31, 46 chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):47-48; 1977.

4413 INTERACTION OF BILE SALTS AND NON-LIPOLYTIC PANCREATIC ENZYMES IN VIVO [Abstract]. (Eng.) Green, G. M. (Children's Hosp., Oakland, CA 94609). *Fed. Proc.* 37(3):459; 1978.

4414 A NEW PROTEASE IN HUMAN PANCREATIC JUICE [Abstract]. (Eng.) Rinderknecht, H.; Renner, I. G.; Carmack, C.; Freidman, R.; Koyama, P. (Veterans Admin. Hosp., Sepulveda, CA). *Clin. Res.* 26(2):112; 1978.

4415 GASTRIN AND CCK DO NOT MEDIATE THE HUMAN PANCREATIC POLYPEPTIDE (HPP) RESPONSE TO A MEAL [Abstract]. (Eng.) Taylor, I. L.; Corazziari, E.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 26(2):113A; 1978.

4416 EFFECT OF ALTERED INTRAGASTRIC pH ON HUMAN PANCREATIC POLYPEPTIDE (HPP) RELEASE [Abstract]. (Eng.) Taylor, I. L.; Walsh, J. H.; Hogan, D. L.; Isenberg, J. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 26(2):113A; 1978.

See also, 4399, 4551, 4599, 4782, 4997.

SECRETION AND METABOLISM

Hepatobiliary Tract

4417 EVALUATION OF LIVER FUNCTION BY INDOCYANINE GREEN (UJOVIRIDIN®) DURING NORMAL PREGNANCY, DELIVERY AND PUERPERIUM. (Ger.) Rudolf, H.; Goretzlehner, G.; Brugmann, E.; Towe, J.; Rudolf, K. (Klinik fur Innere Medizin, Ernst-Heydemann-Strasse, DDR-25, Rostock 1, E. Germany). *Zentralbl. Gynaekol.* 99(25):1548-1553; 1977.

Liver function was studied by the indocyanine green test (0.5 mg/kg i.v. in the form of bolus) during normal pregnancy, delivery, and *post partum* in 168 normal primigravidas and multigravidas and 18 normal nonpregnant women. None of the subjects had hepatopathy or cardiopathy. There was no significant difference in indocyanine green excretion between the control group (indocyanine half-life=3.64 min) and the pregnant women (3.77 min during the 8th week of pregnancy and 3.99 min during the 36th week). The half-life period increased during delivery (7.02 min), but it was normal again during the puerperium (3.92 min on the second day *post partum*). No placental transfer of the dye was demonstrable. The increase in the half-life during delivery is due to the physiological alterations of pregnancy. Indocyanine green is recommended instead of BSP for the estimation of the excretory function of the liver during pregnancy and puerperium.

4418 STUDIES USING SEDIMENTATION VELOCITY ON HETEROGENEITY OF SIZE AND FUNCTION OF HEPATOCYTES FROM MATURE MALE RATS. (Eng.) Sweeney, G. D.; Garfield, R. E.; Jones, K. G.; Latham, A. N. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *J. Lab. Clin. Med.* 91(3):432-443; 1978.

Methods to separate liver cells on the basis of size were developed to explore, using isolated cells, possible bases for selective centrilobular damage in liver damage by toxic substances. Hepatocytes were isolated from livers of fasted mature male Wistar rats after collagenase digestion. Examination of the size profile of these cells showed a modal peak ($3,979 \pm 277\ \mu m^3$, n=3) with significant skewing to the right. Sedimentation velocity analysis (SVA) permitted this hepatocyte suspension to be resolved into 12 fractions sedimenting at 97 to 25 mm/hr. Graphic representation of cell counts and cell volumes in fractions 1 to 12 recreated the cell size profile of the cell suspension prior to analysis. Mean volumes of cells in fractions 1 to 12 ranged from $10,920\ \mu m^3$ (fraction 1) to $2,320\ \mu m^3$ (fraction 12). Approximately one-fifth of recovered cells were found in fraction 9 (volume=$4,066\ \mu m^3$). Micromethods were developed to examine cytochrome P-450 content and aryl hydrocarbon hydroxylase (AHH) activity in fractionated cells. Analyses were conducted on paired fractions and expressed as a ratio of P-450 content per cell in the separated fractions to P-450 content per cell in the unseparated hepatocyte suspension. AHH was expressed similarly. Roughly sixfold greater P-450 content was found in fractions 1 + 2 than in fractions 9 + 10. The range for AHH activity was approximately fourfold, whereas the volumes of the cells differed only by a factor

of 2.5. Cell densities were computed from sedimentation velocities and measured cell volume in each of fractions 1 to 12. Results ranged from 1.08 to 1.12 g/cm^3 with evidence for a discontinuity in the density profile in the region of fractions 5 to 7. This was attributed to the existence of two discrete cell populations: larger lighter cells and smaller heavier cells. Limited morphologic studies were conducted in which "large cells" (fractions 1 to 5) and "small cells" (fractions 8 to 11) were pooled and examined by electron microscopy. Cell detail was well preserved, difference in cell size was evident, and obviously binucleate cells were found only among the large cells. This work demonstrates significant heterogeneity among populations of hepatocytes and suggests that the larger cells have significantly greater activity of mixed function oxygenase systems. Sedimentation velocity-volume characteristics suggest the existence of two cell populations.

4419 EFFECTS OF PHENOBARBITAL AND 3-METHYLCHOLANTHRENE PRETREATMENT ON SIZE, SEDIMENTATION VELOCITY, AND MIXED FUNCTION OXYGENASE ACTIVITY OF RAT HEPATOCYTES. (Eng.) Sweeney, G. D.; Jones, K. G.; Krestynski, F. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *J. Lab. Clin. Med.* 91(3):444-454; 1978.

Sedimentation velocity analysis (SVA) was used to separate liver cells from rats pretreated for 3 days with phenobarbital (PB, 40 mg/kg, i.p., b.i.d.) or 3-methylcholanthrene (3-MC, 50 mg/kg as a single injection). Twelve fractions of cells were collected with sedimentation velocities (Vs) ranging from 97 mm/hr (fraction 1) to 25 mm/hr (fraction 12). PB caused the average volume of the largest cells recovered (fraction 1) to increase to 16,725 μm^3 from the 10,500 μm^3 previously reported in untreated animals. The number of cells recovered in the fast-sedimenting fractions (1-6) also increased in volume, but there was only a small rise in the average modal volume of hepatocytes determined prior to SVA. In cell suspensions analyzed after PB treatment, no evidence was found for a discontinuity in the distribution of density-volume characteristics. Prior to sedimentation analysis, hepatocyte suspensions from rats treated with PB contained an increased amount of cytochrome P-450. The average ratio (n=4) of P-450 in separated to unseparated cells ranged from 2.75 (fractions 1 + 2) to 0.38 (fractions 11 + 12), giving a 6.8-fold range in quantity of cytochrome per cell. Over this range, cell volume increased 4.2-fold, indicating a gradient in P-450 concentration similar to that previously reported to exist in cells from untreated rat liver. The gradient for aryl hydrocarbon hydroxylase (AHH) activity was 6.7-fold, suggesting that the activity of mixed function oxygenases (MFOs) paralleled the increase in cytochrome concentration. 3-MC pretreatment caused no significant increase in either size or number of cells in the fast-sedimenting fractions, but the discontinuity in density-volume characteristics that distinguished fast- and slow-sedimenting cells of untreated rats became marked. Furthermore, both the size and number of cells recovered in fractions 7 to 11 (that include the modal peak volume of unseparated hepatocytes) were increased. The gradient of P-450 (or P_1-450) was less steep in 3-MC-treated cells, with pooled fractions 1 and 2 containing an average of 4.62 times as much cytochrome as fractions 11 and 12. The gradient for AHH concentration was 4.29 times greater. The range of cell volume was 3.3-fold from fractions 1 + 2 to fractions 11 + 12. Additional experiments were performed to determine whether P-450, AHH, or NADPH cytochrome c reductase exhibited differences in activity or concentration per unit of cell volume between cells on either side of fraction 7 where discontinuity had been noted. Each variable was expressed per unit of cell volume in fractions 5 and 9; ratios were compared but were indistinguishable from unity. It is concluded that induction of MFO activity had occurred equally in both populations of cells. Densities were calculated from Vs and cell volume. Noticeable loss of density followed PB treatment in cells of all sizes. 3-MC had less of an effect on density but enhanced the increment in density observed at fraction 7, which corresponds to the division between cells with distinct sedimentation characteristics. These studies suggest that the enhancement by PB and 3-MC of different patterns of hepatic MFO activity are associated with different patterns of growth and development of the parenchymal cells during the 3-day treatment periods.

4420 HEPATIC CLEARANCE OF ENDOTOXINS: DIFFERENCES IN ARTERIAL AND PORTAL VENOUS INFUSION. (Eng.) Wolter, J.; Liehr, H.; Grun, M. (Dept. Surgery, Univ. Wuerzburg, W. Germany). *J. Reticuloendothel. Soc.* 23(2):145-152; 1978.

Studies were undertaken to determine whether there is a difference in the clearance of a fixed dose (0.16 mg/kg) of endotoxins by hepatic Kupffer cells when it is administered to minipigs via the hepatic artery or the portal vein. After arterial infusion, 11.4 μg of endotoxin per kg of body weight were extracted by the liver from the hepatic arterial blood before detectable amounts of endotoxin occurred in the hepatic venous blood in contrast to 57.0 μg/kg when administration was by portal venous infusion. This difference is thought to be due to at least two factors: (a) blood stream velocity within the liver (as measured by indocyanine green transit times), which was more rapid via the arterial route (3.6 ± 0.2 sec) than via the portal venous route (8.3 ± 0.3 sec) and (b) a shunting of blood flow due to portal hepatic venous and hepatic arterial venous intrahepatic shunts. Since such hemodynamic alterations are present in liver cirrhosis they may be the cause of the frequently observed systemic endotoxemia. These data indicate that endotoxin clearance is less efficient in the hepatic arterial blood system than in the hepatic portal venous system.

4421 BILE SECRETION AND LIVER CELL HETEROGENEITY IN THE RAT. (Eng.) Gumucio, J.

J.; Balabaud, C.; Miller, D. L.; DeMason, L. J.; Appelman, H. D.; Stoecker, T. J.; *et al.* (Univ. Michigan Medical Sch., Ann Arbor, MI 48109). *J. Lab. Clin. Med.* 91(2):350-362; 1978.

The contribution of hepatocytes of different acinar zones to bile salt transport and to the secretion of the bile salt-nonindependent fraction of canalicular water (BSNDF) was studied in female Sprague-Dawley rats. Changes in the removal of ^{14}C-taurocholate from blood, in the biliary secretion of taurocholate, and in canalicular flow were determined after damage of the periportal (acinar zone 1) or centrilobular (acinar zone 3) areas by allyl alcohol (6.2 mmol/kg) or bromobenzene (3.8 mmol/kg), resp. The extent of cell necrosis was quantitated by light microscopy, and the quality of the intracellular damage was assessed by electron microscopy. After either periportal or centrilobular damage, surviving cells responded to an i.v. infusion of taurocholate (300 nmol/min/100 g) by secreting bile salts into bile at a rate similar to controls. However, following the administration of ^{14}C-taurocholate at a high concentration (15 nmol/100 g) and as a single bolus, the rate of removal of this isotope from blood was slower than in controls. Both experiments suggest that periportal and centrilobular hepatocytes have the capability for bile salt transport. Consequently, since the concentration of bile salts in sinusoidal blood at each zone determines the relative contribution of hepatocytes to bile salt transport, periportal cells probably transport the largest amount of bile salts reaching the acinus. Canalicular bile flow, on the other hand, decreased following centrilobular cell damage, and this was associated with a high concentration of bile salts in bile. This suggests that, at bile salt loads near physiological concentrations, the predominant contribution of centrilobular hepatocytes is to the secretion of the BSNDF.

4422 STUDY OF BILE ACIDS BIOSYNTHESIS IN RAT LIVER SLICES USING [1-^{14}C]ACETATE: RESULTS WITH RATS FED A BASAL DIET WITH OR WITHOUT CHOLESTYRAMINE SUPPLEMENTATION. (Fre.) Grandgeorge, M.; Duperray, B.; Pacheco, H. (Institut National de Sciences Appliquees, 20, ave. Albert-Einstein, F 69621 Villeurbanne, France). *J. Pharmacol.* 8(3):297-314; 1977.

A method for the *in vitro* measurement of bile acid synthesis is presented and applied to the investigation of the biosynthesis of cholesterol, cholic acid (C), chenodeoxycholic acid (CDC), and fatty acids in rat liver slices from male Wistar rats incubated with the radioactive precursor 1-^{14}C-acetate for 75 min. Following incubation, the bile acids were extracted, methylated, separated by column chromatography, purified by thin-layer chromatography, and their radioactivity compared to that of the remaining free cholesterol. In 10 rats on the unsupplemented diet, the ratio of C+CDC: cholesterol was dependent on the 7-α-hydroxylase activity, while the ratio CDC:C varied inversely with 6-β-hydroxylase and 12-α-hydroxylase activity. When rats were given cholestyramine (192 mg Dowex resin in suspension/rat/day, by intragastric tube) for 10 days prior to sacrifice, the production of C increased by 184% and the level of C+CDC rose 68%. The ratio CDC:C dropped from 1.82 to 0.77. Incorporation of 1-^{14}C-acetate into fatty acids rose by 55%, but this rise was not significant because of the wide scattering of results. The incorporation of 1-^{14}C-acetate into cholesterol increased by 340% and the amount of free cholesterol in the liver rose by 15%. Serum and intestinal cholesterol were not significantly increased over controls. These results are consistent with an activation of 7-α-hydroxylase, 12-α-hydroxylase, and 6-β-hydroxylase activities by cholestyramine.

4423 PHYSIOLOGICAL FACTORS INFLUENCING SERUM BILE ACID LEVELS. (Eng.) Ponz de Leon, M.; Murphy, G. M.; Dowling, R. H. (Guy's Hosp. Medical Sch., London, England). *Gut* 19(1):32-39; 1978.

The effects of fasting (prolongation of an overnight fast for a further 4 hr), feeding (the response to eating the three main "solid" meals of the day), and cholecystokinin (CCK)-induced gallbladder contraction (75-100 U of CCK given as a bolus i.v. injection) on serum individual bile acids were studied in five to eight healthy subjects. The serum conjugates of cholic and chenodeoxycholic acids were measured using sensitive specific radioimmunoassays. During fasting, there was no significant change in the levels of the individual serum bile acids (conjugates of cholate, 1.28 ± 0.19 μM; conjugates of chenodeoxycholate, 1.17 ± 0.17 M). After breakfast, the serum conjugates of cholate and chenodeoxycholate increased significantly, but thereafter the mean values remained high with less consistent responses to lunch and dinner. Some subjects showed a peak and trough response to all three meals, while others showed a plateau response throughout the day. After breakfast, the serum chenodeoxycholate conjugates increased more rapidly (peak at 60 min, when the concentration reached 2.07 ± 0.30 μM) and to a greater extent than the conjugates of cholate (peak at 90 min, 1.50 ± 0.24 μM). A similar pattern of results was seen after i.v. CCK, suggesting either preferential jejunal absorption of chenodeoxycholate conjugates and/or preferential hepatic clearance of cholate conjugates. These results provide essential background data for future studies of serum individual bile acids in intestinal and hepatic disease.

4424 URSODEOXYCHOLATE--IN VITRO CHOLESTEROL SOLUBILITY AND CHANGES OF COMPOSITION OF HUMAN GALLBLADDER-BILE AFTER ORAL TREATMENT. (Eng.) Igimi, H.; Tamesue, N.; Ikejiri, Y.; Shimura, H. (First Dept. Surgery, Fukuoka Univ., Fukuoka, 814, Japan). *Life Sci.* 21(9):1373-1379; 1977.

To investigate the usefulness of ursodeoxycholic acid (UDCA) for gallstone dissolution, the *in vitro* solubility of cholesterol in bile salt solutions with and without lecithin and the composition of gallbladder bile in 25 patients after treatment with UDCA were examined. Solutions of the Na salts of

UDCA, chenodeoxycholic acid (CDCA), and cholic acid (CA) were prepared at 100, 50, and 25 mM concentrations, and 50 and 100 mM solutions of equimolar amounts of NaUDCA and NaCDCA or of NaCA and NaUDCA were also made. Lecithin at one-fourth of the given salt concentration was added to these solutions for some experiments. Cholesterol solubility increased proportional to the salt concentration. NaCDCA had the best solubilizing properties and NaUDCA the worst (233.7 ± 2.0, 102.4 ± 1.8, and 42.3 ± 1.1 mg/dl compared to 2.1 ± 0.1, 1.5 ± 0.1, and trace mg/dl at 100, 50, and 25 mM, resp.). All other bile salt solutions gave intermediate results. The addition of lecithin to the bile salt solutions increased cholesterol solubilization to a large extent, but did not change the efficacy relationships among the bile salt solutions. Five groups of five patients each, all with diseases not in the hepatobiliary tract, were given daily p.o. doses of 0, 150, 300, 600, or 1,200 mg NaUDCA for 1 week. The content of total bile acids, phospholipids, and cholesterol as well as of the single bile acid UDCA were increased. At the 300 and 600 mg doses of UDCA, the mole percentage of total bile acids was increased ($p<0.01$), and that of phospholipids and of cholesterol was decreased ($p<0.01$ and $p<0.05$ or $p<0.01$, resp.). The 1,200-mg/day dose had a significant effect only on the cholesterol level, decreasing it ($p<0.01$). The UDCA treatment does not appear to influence the metabolism of the other bile acids as does treatment with CDCA. Oral treatment with UDCA should be inferior to CDCA treatment for the dissolution of gallstones.

4425 REMOVAL OF PLASMA BILIRUBIN BY HEMOPERFUSION IN DOGS. (Eng.) Lopukhin, U. M.; Molodenkev, M. N.; Leykin, U. A.; Gorchakov, V. D.; Evseev, N. G.; Ryabov, A. V. (2nd Moscow Medical Inst., Moscow Inst. Chemical Technology, Moscow, USSR). *Am. J. Gastroenterol.* 68(4):345-353; 1977.

To develop and examine blood compatible adsorbents with high specificity for bilirubin, acute hepatic insufficiency was induced in mongrel dogs using common bile duct catheter infusion of 0.1 ml/kg carbon tetrachloride followed by ligation of the duct above and below the site of the catheter insertion and, 24 hr later, by hemoperfusion. The adsorbent MCTI-2A, a modified anion exchange resin, was investigated in an extracorporeal system. Blood samples were obtained at 5-min intervals from 0-60 min from the arterial line and at 5-min intervals from 6-61 min from the venous line, and the concentrations of K, Na, Cl^-, blood urea nitrogen, glucose, total protein, albumin, Ca, uric acid, inorganic phosphates, cholesterol, and total bilirubin were measured. The platelet count, WBC count, hematocrit, rate of hemolysis, acid balance, and the activities of alkaline phosphatase, LDH, SGOT, and SGPT were determined. No substantial physiological or biochemical changes were observed during perfusion; hemolysis was constant, WBC count decreased somewhat, the hematocrit was reduced 2-4%, and the acid-base balance did not change. There was no adsorption of cholesterol, and the activities of the enzymes measured were not altered. After 5-10 min of perfusion, bilirubin adsorption became greater than the rate of its flux from tissue stores and its concentration in the blood fell, if the initial concentration of bilirubin in the blood was high. With a low initial level of bilirubin (1-3 mg/dl), the level in the blood did not decrease because the rate of flux from the tissues was equal to or greater than the rate of removal by adsorption in the column. The results show that MCTI-2A adsorbent may prove to be useful for the treatment of hyperbilirubinemia.

4426 MULTICOMPARTMENTAL ANALYSIS OF CHOLESTEROL METABOLISM IN MAN: CHARACTERIZATION OF THE HEPATIC BILE ACID AND BILIARY CHOLESTEROL PRECURSOR SITES. (Eng.) Schwartz, C. C.; Berman, M.; Vlahcevic, Z. R.; Halloran, L. G.; Gregory, D. H.; Swell, L. (Veterans Admin. Hosp., Richmond, VA 23249). *J. Clin. Invest.* 61(2):408-423; 1978.

Six patients who had undergone cholecystectomy and choledocholithotomy for gallstones and who each had a balloon-occludable T-tube in the common bile duct were given simultaneous i.v. injections of various combinations of ^{14}C-mevalonic acid, ^{3}H-mevalonic acid, and ^{14}C-cholesterol, and the secretion of bile acids and biliary cholesterol was monitored to develop a multicompartmental model of cholesterol metabolism in man. Bile was collected for short intervals (5, 15, or 30 min) during the first 4 hr after administration of the labeled compounds and for longer intervals until the end of the experiment. Venous blood (5 ml) was collected at frequent intervals. The qualitative features of the specific activity time course curves after labeled mevalonic acid and cholesterol revealed no precursor-product relationship between bile acid, biliary cholesterol, and plasma free cholesterol. The data were subjected to simulation analysis and computer modeling, with the constraint that the model fit the data obtained from both ^{14}C-cholesterol and ^{3}H-mevalonic acid. The fluxes arrived at in the model indicate that 31% and 20%, resp., of the cholesterol input into the bile acid and biliary cholesterol precursor sites were derived directly from the newly synthesized hepatic cholesterol. The remainder had its origin predominantly from lipoprotein-free cholesterol. Plasma esterified cholesterol (as free) made a small contribution (11%) to the bile acid compartment. Ten percent of the biliary cholesterol arose from an unknown hepatic site. These findings provide evidence for the existence of specific hepatic cholesterol precursor sites associated with the formation and secretion of bile acids and biliary cholesterol and a mechanism regulating the partitioning of lipoprotein free cholesterol between the bile acid and biliary cholesterol precursor sites.

4427 ZINC UPTAKE BY ISOLATED RAT LIVER PARENCHYMAL CELLS. (Eng.) Failla, M. L.; Cousins, R. J. (Dept. Nutrition, Rutgers-State Univ. New Jersey, New Brunswick, NJ 08903). *Biochim. Biophys. Acta* 538(3):435-444; 1978.

Primary cultures of rat liver parenchymal cells maintained as a monolayer in serum-free culture medium were used to investigate the characteristics of zinc accumulation *in vitro*. Liver parenchymal cells accumulated zinc by a temperature-dependent, saturable process. Approximately 25 times more zinc was associated with cells incubated at 37 C than replicate cell cultures at 0 C. Zinc accumulation was inhibited by cyanide (2.5 mM), azide (5.0 mM), oligomycin (0.07 mM), *N*-ethylmaleimide (5.0 mM), and iodoacetamide (5.0 mM); the amounts of zinc accumulated in the presence of each inhibitor were 38.5%, 73.1%, 65.4%, 34.6%, and 23.1% of control, resp. Cadmium reversibly inhibited zinc accumulation in both serum-free and serum-containing media. Gel filtration chromatography showed that recently accumulated intracellular zinc was present as a low molecular weight complex smaller than metallothionein, the zinc storage protein, but larger than individual amino acids. The quantity of zinc accumulated was affected by preincubation of the cells with various hormones. Dexamethasone, prednisone, and prednisolone each increased zinc uptake by 40-50% when either insulin or glucagon was also present. Hydrocortisone, cortisone, and sex steroids did not influence zinc accumulation. Removal of the polypeptide hormones from the medium abolished the stimulatory effect of the synthetic glucocorticoid steroid hormones on zinc accumulation. The characteristics of zinc accumulation by rat liver parenchymal cells are similar to those reported for zinc transport in microorganisms, HeLa cells, and human lymphocytes.

4428 THE METABOLISM OF DRUGS IN ISOLATED RAT HEPATOCYTES. A COMPARISON WITH IN VIVO DRUG METABOLISM AND DRUG METABOLISM IN SUBCELLULAR LIVER FRACTIONS. (Eng.) Billings, R. E.; McMahon, R. E.; Ashmore, J.; Wagle, S. R. (Dept. Pharmacology, Univ. Iowa, Iowa City, IA 52242). *Drug Metab. Dispos.* 5(6):518-526; 1977.

To more closely approximate *in vivo* liver metabolism in an *in vitro* system, drug metabolism was studied in isolated liver cells rather than in liver homogenate fractions. The ability of isolated hepatocytes from male Sprague-Dawley rats to metabolize α-l-acetylmethadol (LAM), *d*-propoxyphene, butamoxane, ethinimate, 8-methoxybutamoxane (8-MB), *p*-nitrophenol (PNP), *N*,*N*-dimethylphenoxyethylamine (DPE), and *N*,*N*-dimethyl-*p*-chlorophenoxyethylamine (DCPE) was studied. This metabolism was compared to that *in vivo* and in 9,000 x *g* supernatant and microsomal liver fractions. Butamoxane and ethinimate were hydroxylated at a linear rate for at least 2 hr in isolated hepatocytes, but the *N*-methylation of LAM was linear only for 30 min. PNP was rapidly metabolized to the glucuronide conjugate. The metabolic rates of LAM, *d*-propoxyphene, and DPE were similar in hepatocytes and in the 9000 x *g* supernatant, but those of DCPE, ethinimate, butamoxane, and 8-MB were considerably slower. The rate limiting factor was not the NADPH concentration, the $NADPH/NADP^+$ ratio, or the cytochrome P-450 concentration. Ethinimate metabolism exhibited a lower V_{max} (nmol/mg protein/15 min) in the isolated hepatocytes (7.81 ± 0.42) than in the supernatant fraction (10.90 ± 0.55). Butamoxane was rapidly hydroxylated (nmol/nmol cytochrome P-450/min) in all the systems examined, the rate being similar in perfused liver (1.8 ± 0.19) and in isolated hepatocytes (2.3 ± 2.7) but 2.5-fold higher in microsomes (4.8 ± 0.37). The identification of ketoethinimate, a new metabolite of ethinimate, as a result of the use of intact cells, and its subsequent discovery in the urine of rats dosed with ethinimate, showed the value of using intact cells in metabolic studies of new drugs. Ethinimate metabolism in isolated hepatocytes correlated well with its metabolism in the rat. The study indicated that drug metabolism in isolated hepatocytes more closely resembles *in vivo* metabolism than that observed in liver homogenate fractions such as microsomes.

4429 THE HEPATIC EFFECTS OF HYPOLIPIDEMIC DRUGS (CLOFIBRATE, NAFENOPIN, TIBRIC ACID, AND Wy-14,643) ON HEPATIC PEROXISOMES AND PEROXISOME-ASSOCIATED ENZYMES. (Eng.) Moody, D. E.; Reddy, J. K. (Northwestern Univ. Medical Sch., Chicago, IL 60611). *Am. J. Pathol.* 90(2):435-446; 1978.

Male Swiss-Webster mice were fed diets containing four hypolipemic agents known to induce proliferation of hepatic peroxisomes, to determine their effects on liver enlargement and hepatic peroxisome-associated enzyme activities. Treatment with all four drugs (clofibrate, nafenopin, tibric acid, and Wy-14,643; 0.25%, 0.125%, 0.125%, and 0.125% of diet, resp., for 28 days) produced marked hepatomegaly in the mice. The extent of the increase in liver weight correlated well with the increases in total hepatic DNA (r=0.856) and in the collective volume of hepatocyte peroxisomes (r=0.667). Treatment with these drugs also produced similar increases in the activities of peroxisome-associated enzymes. The most dramatic increases were noted in the activities of the short-chain (8- to 26-fold) and medium-chain (4- to 11-fold) carnitine acyltransferases. Significant increases were also noted in the activities of catalase (twofold to threefold), α-glycerophosphate dehydrogenase (twofold to threefold), and the long-chain carnitine acyltransferase (twofold to fourfold). Activity of the latter enzyme, however, is not known to be associated with peroxisome fractions. Concomitant administration of actinomycin D (10 min, 0.75 mg/kg, i.p.) or cycloheximide (1.5 mg/kg, i.p.) with a single p.o. dose of clofibrate diminished the increases in liver weight and carnitine acyltransferase activity that had occurred with clofibrate treatment alone. The finding that the major increase in activity of peroxisome enzymes occurred in those associated with metabolism of acyl coenzyme A groups supports the hypothesis that the hypolipemic action of the drugs and the proliferation of hepatic peroxisomes are related functions.

4430 A QUANTITATIVE ANALYSIS OF FINE STRUCTURE AND DRUG METABOLISM IN LIVERS OF CLOFIBRATE-TREATED YOUNG ADULT AND RETIRED BREEDER RATS.

(Eng.) Anthony, L. E.; Schmucker, D. L.; Mooney, J. S.; Jones, A. L. (San Francisco Veterans Admin. Hosp., San Francisco, CA 94121). *J. Lipid Res.* 19(2):154-165; 1978.

The effects of clofibrate on the fine structure and drug metabolizing capacity of livers of normolipemic young adult virgin (YA) and hypercholesterolemic retired breeder (RB) male rats were measured by morphometric and biochemical procedures. The p.o. administration of clofibrate (200 mg/kg) for 7 days significantly increased liver weight ($p<0.001$) and reduced the cholesterol concentrations in the serum and liver tissue ($p<0.001$) in both groups of animals. The hepatic triglyceride (TG) concentration and the volume of cytoplasmic lipid droplets, presumably TG, as well as the serum TG concentration, increased only in the drug-treated RB rats ($p<0.001$ and $p<0.05$, resp.). Clofibrate treatment resulted in significant increases in the volumes of the hepatocytes (by 78% and 50% in YA and RB rats, resp., $p<0.005$), in their constituent mitochondria (134% and 58%, resp., $p<0.001$) and microbodies (518% and 292%, resp., $p<0.001$), and caused a proliferation of the smooth endoplasmic reticulum (50% and 29%, resp., $p<0.001$). Although the magnitude of the hypocholesterolemic response was considerably greater in the RB animals, the morphological changes were much more marked in the YA group. However, the surface area of the rough endoplasmic reticulum was reduced in the livers of the drug-treated RB rats. NADPH cytochrome c reductase specific activity was significantly increased ($p<0.001$) in both the RB and YA animals, but the concentration of cytochrome P-450 increased only in the YA rats ($p<0.001$). Neither the cytochrome b_5 concentration nor the rate of ethylmorphine *N*-demethylation was significantly affected by clofibrate administration. The results suggest that there is no positive correlation between the hypocholesterolemic response to clofibrate and the degree of subcellular changes in the hepatocytes and that this hypolipemic drug elicits a minimal effect on the concentrations of the components of the hepatic microsomal drug metabolizing system.

4431 CHANGES IN THE PLASMA CLEARANCE AND PROTEIN BINDING OF CARBENOXOLONE WITH AGE, AND THEIR POSSIBLE RELATIONSHIP WITH ADVERSE DRUG EFFECTS. (Eng.) Hayes, M. J.; Sprackling, M.; Langman, M. J. S. (Univ. Nottingham Medical Sch., Nottingham, England). *Gut* 18(12):1054-1058; 1977.

In an effort to understand the adverse side-effects of carbenoxolone treatment for gastric ulcer, a comparison was made by equilibrium dialysis of plasma protein binding sites for carbenoxolone in healthy people under 40 yr of age or over 65 yr of age. Only four of the elderly subjects were receiving any medication. Carbenoxolone (300 mg, p.o.) was administered, and blood samples were taken for analysis at 2, 4, 8, 12, 24, and 36 hr after drug ingestion. The number of binding sites was reduced ($p<0.01$) in the elderly, and this fall was associated with a reduction in plasma albumin levels ($p<0.01$, $r=0.85$). Although carbenoxolone had some aldosterone-like effects, these properties could not be shown to be due to displacement of aldosterone from its protein binding sites by competitive protein binding of carbenoxolone. Single doses of carbenoxolone were found to be removed considerably more slowly from the plasma ($p<0.05$) and to have a markedly longer half-life ($p<0.02$) in elderly individuals than in the young. The results of these three series of experiments suggest that the side-effects of carbenoxolone in the elderly may in part be caused by reduced protein binding, leaving more free drug in the active unbound form, and in part by reduced hepatic clearance mechanisms.

4432 ALTERATIONS OF RAT SERUM LIPOPROTEINS AND LECITHIN-CHOLESTEROL-ACYLTRANSFERASE ACTIVITY IN PRASEODYMIUM-INDUCED LIVER DAMAGE. (Eng.) Grajewski, O.; Von Lehmann, B.; Arntz, H. R.; Arvela, P.; Oberdisse, E. (Pharmakologisches Institut der Freien Universitat Berlin, Thielallee 69/73, D-1000 Berlin 33, W. Germany) *Naunyn Schmiedebergs Arch. Pharmacol.* 301(1):65-73; 1977.

The alterations in serum lipids during liver damage induced by the i.v. injection of 10 mg/kg praseodymium nitrate (Pr) were studied in female Wistar rats. The triglycerides (TG) decreased to about 50% of the control values after 2 days. Total phospholipids (TPL) and cholesterol (C) showed a parallel time course: a 50% decrease 2 and 4 days after Pr administration was followed by a 50% increase at 4 days. The changes in the TPL were mainly due to alterations of phosphatidylcholine (PC) concentration, while the decrease in the concentration of C during the first 2 days was caused by a decrease of the esterified cholesterol (EC), whereas unesterified cholesterol (UC) was responsible for the subsequent increase of C. The fractionation of the serum lipoproteins (Lp) by sequential ultracentrifugation demonstrated a different response to Pr in each Lp class. At 2 days, the very low density lipoprotein (VLDL) concentration decreased by 50%. Experiments with Triton WR 1339 showed an inhibition of hepatic TG secretion at this time. On the other hand, the low density lipoprotein (LDL) increased to more than four times the controls, 4 days after Pr. The accumulating LDL were abnormally rich in UC and PC. Up to 2 days after Pr, the high density lipoprotein (HDL) content declined to about 20% of the concentration in control animals. During the subsequent recovery, the lipid pattern altered as UC and TPL were increased; the HDL_2 were particularly involved. Concomitant with the changes in the lipid patterns of LDL and HDL, the activity of serum lecithin-cholesterol-acyltransferase (LCAT) decreased to about 15% of the initial value, 3 days after Pr. From these results, it is concluded that (1) after Pr, the VLDL, HDL, and LCAT secretion of the liver is inhibited; (2) in the LDL, HDL, and less in the VLDL, UC- and PC-rich Lp occur, resulting in an altered Lp lipid pattern; and (3) the alteration of the lipid pattern is mainly due to the diminution of LCAT activity.

4433 EFFECTS OF CHRONIC ETHANOL CONSUMPTION ON THE RATE OF RAT LIVER MITOCHONDRIAL PROTEIN TURNOVER AND SYNTHESIS. (Eng.) Hofmann,

I.; Hosein, E. A. (Dept. Biochemistry, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Biochem. Pharmacol.* 27(4):457-463; 1978.

The effect of an overall decrease in mitochondrial protein synthesis on the protein turnover rate of mitochondria harvested from the livers of Metrecal-fed controls and chronic ethanol-fed rats was investigated. In addition, experiments were carried out to determine whether the decrease in mitochondrial leucine incorporation represents selective inhibition of leucine incorporation into certain individual proteins or a decrease in total incorporation of labeled leucine in mitochondrial proteins. Incorporation *in vitro* of labeled leucine into isolated Sprague-Dawley rat liver mitochondria was decreased 33-37% in animals chronically fed ethanol (37% of total calories). To avoid artifactual leucine incorporation, no trichloroacetic acid (TCA) precipitation was performed. When these mitochondrial proteins were separated on sodium dodecyl sulfate polyacrylamide gels, no specific reduction of leucine incorporation into any individual protein band was detected. This probably reflected a general decrease in amino acid incorporation occurring in these isolated mitochondria. Incorporation *in vivo* of labeled arginine revealed a decrease in the viability of rat liver mitochondria from chronic ethanol-fed rats, as there as a 2-day decrease in the half-life of these liver mitochondria. Arginine incorporation by the cytoplasmic protein-synthesizing system was increased *in vivo* after chronic ethanol feeding. The results suggest that, if this reaction were to persist through continuous consumption of ethanol, there would in time be diminished amounts of properly assembled proteins that are necessary for membrane structure and function. Whether such induced deficiencies in the mitochondria over a long period of time are precursors for alcoholic hepatitis and/or cirrhosis remains to be elucidated.

4434 ULTRASTRUCTURAL AND BIOCHEMICAL ASPECTS OF LIVER MITOCHONDRIA DURING RECOVERY FROM ETHANOL-INDUCED ALTERATIONS: EXPERIMENTAL EVIDENCE OF MITOCHONDRIAL DIVISION. (Eng.) Koch, O. R.; Roatta de Conti, L. L.; Pacheco Bolanos, L.; Stoppani, A. O. M. (Centro de Patologia Experimental, Facultad de Medicina, Jose E. Uriburu 950, 1114-C.F., Buenos Aires, Argentina). *Am. J. Pathol.* 90(2):325-344; 1978.

Morphologic and biochemical changes occurring in liver mitochondria during recovery from ethanol-induced injury were studied in rats fed a 6-month high-alcohol regimen (37% of diet) plus a nutritionally adequate diet that did not induce fatty liver and compared with isocalorically fed controls. After this period, the alcohol-fed animals displayed striking ultrastructural changes of liver mitochondria and a decreased respiratory activity with succinate or malate-glutamate as substrate. On the contrary, the respiratory rate with l-glycerophosphate was 50% increased. Regression changes were studied after alcohol was withdrawn from the diet. Enlarged mitochondria rapidly disappeared (in 24 hr), although a few megamitochondria were still present after 8 days of abstinence. A similar recovery was observed for the functional alterations. At the end of the experimental period, only a slight decrease of the maximal respiratory rate using malate-glutamate as substrate was noted. The ultrastructural findings and the morphometric data suggests that the way in which mitochondrial normalization takes place is based on partition of these organelles.

4435 ALCOHOL, AMINO ACIDS, AND ALBUMIN SYNTHESIS. III. EFFECTS OF ETHANOL, ACETALDEHYDE, AND 4-METHYLPYRAZOLE. (Eng.) Oratz, M.; Rothschild, M. A.; Schreiber, S. S. (New York Veterans Admin. Hosp., New York, NY). *Gastroenterology* 74(4):672-676; 1978.

The effects of ethanol, 4-methylpyrazole (4-MP), and acetaldehyde on albumin and urea synthesis and on polysome aggregation were studied in isolated perfused rabbit livers. Fed or fasted male rabbits served as donors, and the perfusate contained ethanol (200 mg/100 ml), with and without 1.5 mM 4-MP, or acetaldehyde (2 mg/100 ml), with and without 1.5 mM 4-MP. In livers from fed donors, ethanol depressed albumin and urea synthesis ($p<0.05$) in comparison with controls, and bound polysomes were disaggregated. Perfusion with acetaldehyde caused a similar decrease in albumin and urea synthesis, but did not cause polysome disaggregation. The addition of 4-MP to the ethanol perfusates did not enhance albumin or urea synthesis but did prevent polysome disaggregation. When the donor was fasted, the addition of 4-MP to the ethanol perfusates restored urea synthesis and polysome aggregation to fasted control levels. In the livers from fasted donors, acetaldehyde did not lower albumin or urea synthesis and had no effect on polysome aggregation. The results indicate that the hepatic responses to ethanol and acetaldehyde are different if the livers are derived from fed or fasted donors, and it is not possible to ascribe the toxic effects of acetaldehyde or ethanol on albumin and urea synthesis to either agent, *per se*.

4436 PREVENTION OF ALCOHOL-INDUCED FATTY LIVER BY NATURAL METABOLITES AND RIBOFLAVIN. (Eng.) Stanko, R. T.; Mendelow, H.; Shinozuka, H.; Adibi, S. A. (Montefiore Hosp., Pittsburgh, PA 15213). *J. Lab. Clin. Med.* 91(2):228-235; 1978.

To develop a satisfactory treatment for alcohol-induced fatty liver, the hepatic lipotropic potential of a variety of natural compounds, known to be hydrogen acceptors and/or intermediates in oxidative metabolism of foodstuffs, was investigated in male Sprague-Dawley rats receiving ethanol (1.5 ml of 47.5% ethanol/100 g/day) for 10 days while on the usual rat diet (4.5% fat). Among the compounds tested, a combination of pyruvate, dihydroxyacetone, and riboflavin appeared to be most effective in preventing the ethanol-induced accu-

mulation of esterified hepatic fatty acids ($p<0.01$). Additional studies were performed to investigate the efficacy of these compounds when the fat content of diet was increased to simulate the human diet (35% of caloric intake) and when the duration of ethanol ingestion (33% of caloric intake) was prolonged to 30 days. There was a threefold increase in triglyceride concentration and a 65% increase in the total esterified fatty acid concentration (neither increase being significant) of the liver of ethanol-treated rats as compared to controls. But when pyruvate, dihydroxyacetone, and riboflavin were added to the diet of ethanol-treated rats, these changes were abolished. Light and electron microscopy of the liver revealed that ethanol caused mitochondrial irregularity, vesiculation of the rough endoplasmic reticulum, and a 4+ increase in lipid content. These histological and ultrastructural changes were also abolished when pyruvate, dihydroxyacetone, and riboflavin were added to the diet of ethanol-treated rats. Thus the efficacy of the above compounds as hepatic lipotropic agents appears well established in ethanol-treated rats whether on a low- or high-fat diet.

4437 RENAL SODIUM RETENTION AND ASCITES FORMATION IN DOGS WITH EXPERIMENTAL CIRRHOSIS BUT WITHOUT PORTAL HYPERTENSION OR INCREASED SPLANCHNIC VASCULAR CAPACITY. (Eng.) Levy, M.; Wexler, M. J. (McGill Univ., Rm. 1228, 3655 Drummond St., Montreal, Quebec H3G 1Y6, Canada). *J. Lab. Clin. Med.* 91(3):520-536; 1978.

Renal handling of sodium was studied in five dogs in which an end-to-side portacaval fistula was constructed prior to the induction of cirrhosis with dimethylnitrosamine (DMN). The technique enabled the study of the effective expansion of the plasma volume in dogs with cirrhosis, ascites, and active urinary sodium retention and the determination of the role of portacaval collaterals in the initiation of renal sodium retention. This model permits the effects of cirrhosis to be studied separately from the consequences of portal hypertension. Three controls without cirrhosis maintained normal liver and kidney function and remained in sodium balance for as long as 8 weeks following surgery. In the five cirrhotic dogs, urinary sodium retention preceded ascites formation and was independent of hyperaldosteronism, hypoalbuminemia, hepatic ischemia, or decreased renal perfusion. Portal venous pressure remained normal in all cirrhotic dogs, and the splanchnic area remained free of venous collaterals. Plasma volume expansion also preceded ascites formation, and this variable increased by 8.4% ($p<0.05$) following 6 days of sodium retention. These temporal relations between sodium retention, expanded plasma volume, and ascites formation are similar to those previously observed in ordinary cirrhotic dogs. Total plasma volume increased by 13.2% ($p<0.05$) when measured during the ascitic phase of cirrhosis. However, when the splanchnic and nonsplanchnic (effective) components of plasma volume were measured by an exclusion technique, the ratio of these components to total plasma volume was not different from that observed in normal dogs. Thus, no preferential consignment of retained salt and water had occurred. It is concluded that urinary sodium retention in cirrhotic dogs occurs independently of portal hypertension or augmented splanchnic vascular capacity and is associated with expansion of the effective plasma volume, even though ascites is present.

4438 EXTRACORPOREAL PERFUSION WITH BABOON LIVER IN THE TREATMENT OF HEPATIC COMA. (Ger.) Lie, T. S.; Dengler, H. J.; Gutgemann, A.; Rommelsheim, K.; Lelbach, W. K.; Holst, A.; Marsteller, H. J.; *et al.* (Chirurgische Universitatsklinik, 5300 Bonn 1, Venusberg, W. Germany). *Dtsch. Med. Wochenschr.* 102(42):1506-1511; 1977.

Eleven patients with hepatic coma (stage IV and V according to Abouna) were treated by extracorporeal blood perfusion with 22 baboon livers and one human liver over 12-27 hr, using the Scribner shunt (radial or profunda femoris artery). Ten patients had viral hepatitis, and one had acute liver cell necrosis. The duration of the coma before the perfusion was 1-3 days in 10 cases and 4 days in 1 case. Five patients received one perfusion treatment and the others received two to four. As a result of the treatment, eight patients emerged from the coma, and six of them showed regeneration of the liver. Four of these patients were cured and the others died (4 from liver insufficiency, 1 from pancreatic necrosis, 1 from acute hemorrhage, and 1 from uncontrollable hemorrhage from an old ulcer). No antibodies to baboon proteins were found after perfusion, which means there is very little danger of anaphylactic reaction upon repeated perfusion. The preformed cytotoxic antibody titer to baboon cells rose in the patients' serum only after 1-2 weeks, and decreased again after 4 weeks. The findings indicate that extracorporeal perfusion with baboon or human liver is a promising method for treatment of hepatic coma.

4439 A MODEL OF FULMINANT HEPATIC FAILURE IN THE RABBIT. (Eng.) Blitzer, B. L.; Waggoner, J. G.; Jones, E. A.; Gralnick, H. R.; Towne, D.; Butler, J.; *et al.* (Liver Unit, DDB, NIAMDD, Bld. 10, Rm. 4D-52, Natl. Inst. Health, Bethesda, MD 20014). *Gastroenterology* 74(4):664-671; 1978.

A highly reproducible model of fulminant hepatic failure was developed by administering galactosamine hydrochloride (4.25 mmol/kg, i.v.) to 34 genetically uniform rabbits. Twenty-five rabbits died between 21 and 44 hr after injection following a period of coma that lasted an average of 2.6 hr. An additional five rabbits died between 44 and 91 hr; there were two early deaths (<20 hr) and two survivors. Serum biochemical tests and liver histology reflected massive hepatic injury. Changes in plasma ammonia and amino acid concentrations, in coagulation parameters, and in the electroencephalogram were similar to those found in human fulminant hepatic failure. This model appears promising for

future studies of the pathogenesis and treatment of fulminant hepatic failure.

4440 EXPERIMENTAL LIVER FAILURE: A COMPARISON BETWEEN HEPATECTOMY AND HEPATIC DEVASCULARIZATION IN THE PIG. (Eng.) Tonnesen, K. (Rigshospitalet, Copenhagen, Denmark). *Acta Chir. Scand.* 143(5):271-277; 1977.

The use of hepatectomy and total hepatic devascularization in pigs as models of human hepatic failure were compared. No significant difference was found in the survival time that was 16 hr 2 min ± 57 min in the anhepatic and 18 hr 33 min ± 1 hr 5 min in the devascularized pigs. The blood pressure of the anhepatic pigs decreased gradually; in contrast, that of the devascularized pigs remained stable during most of the experimental period with a terminal steep decrease. Except for an increase in the concentration of serum alanine aminotransferases and free hemoglobin, seen in the devascularized but not in the anhepatic preparation, no differences between the two models were seen. It is concluded that the devascularized preparation is the most suitable model for experimental hepatic failure.

4441 CHOLESTEROLOSIS: PHYSICAL-CHEMICAL CHARACTERISTICS OF HUMAN AND DIET-INDUCED CANINE LESIONS. (Eng.) Holzbach, R. T.; Marsh, M.; Tang, P. (St. Luke's Hosp., Cleveland, OH 44106). *Exp. Mol. Pathol.* 27(3):324-338; 1977.

A canine model was developed for cholesterolosis, and the naturally occurring human and the experimental lesions were compared by physical and chemical analysis of tissue lipids. A lesion with similarities to the human planar form of cholesterolosis was reproducibly induced by feeding a cholesterol, cholic acid-containing diet (1.0% by caloric value and 0.5% by mass, resp.) to 12 dogs for 9 months. Identical physical and chemical analyses were performed on the canine lesions and those from 17 human gallbladder cholesterolosis samples. Gross and histopathological similarities were seen in the human and experimental lesions, with the most notable difference being that the canine lesion is entirely epithelial (mucosal), whereas the human lesion is submucosal. Physically and chemically, the lesions showed both differences and resemblances. The lipid composition of the human and canine lesions varied significantly with respect to cholesterol esters, triglycerides, free fatty acids, and free cholesterol ($p<0.05$, $p<0.005$, and $p<0.05$, resp.), but not with respect to phospholipids. Subfractionation of the component cholesterol esters and free fatty acid species showed similarities in compositional pattern for the canine and human lesions. The relative degree of cholesterol saturation in gallbladder biles varied from a saturation index of 0.1 (controls) to 0.2 (experimental lesions) in dogs; the saturation index was 1.6 in the humans with lesions, but this was not appreciably higher than in healthy controls. The lack of correlation between cholesterol saturation and extent or chemical characteristics of cholesterol lesions argues strongly against a role for biliary cholesterol supersaturation in the pathogenesis of cholesterol lesions. The chemical similarity in either case by lipid-lipid interaction generates development of a two-phase system, including a quantitatively variable lamellar mesophase component, which accounts for birefringent properties. The etiology of cholesterolosis appears unrelated to the process of human gallstone formation. Similarities were observed between the lipid composition of the human intimal fatty streak lesion of atherosclerosis and that of human cholesterolosis, despite the differences in lipid localization.

4442 EFFICACY OF VITAMIN E AND SODIUM SELENITE IN EXPERIMENTAL LIVER DYSTROPHY. (Rus.) Skakun, N. P.; Nesterovich, Ia. M. (Dept. Pharmacology, Medical Inst., Ternopol, USSR). *Farmakol. Toksikol.* 40(4):434-438; 1977.

The efficacy of combined administration of vitamin E and sodium selenite was studied in albino rats with CCl_4-induced liver dystrophy. Animals received daily s.c. injections with 50% CCl_4 (0.4 ml/100 g, for 4 days), daily i.m. injections with vitamin E (10 mg/100 g) and/or daily s.c. injections of sodium selenite (2 µg/100 g). The functional state of the liver was evaluated on days 7, 14, 21, and 28 of the experiment. Rats exposed to CCl_4 alone showed a marked decrease of bile secretion and of the content of bile cholates. Lethality in nontreated rats was 12.5% (compared with 0% in treated animals). Bile secretion was increased by 9% in rats treated with vitamin E alone, by 22% in rats treated with sodium selenite alone, and by 25% in rats treated with a combination of the drugs. Treatment by these three regimens also increased the content of bile cholates (by 29%, 30%, and 52%, resp.).

4443 STUDIES ON HUMAN HEPATITIS A VIRUS IN CHIMPANZEES. (Eng.) Thornton, A.; Tsiquaye, K. N.; Zuckerman, A. J.(London Sch. Hygiene and Tropical Medicine, London WC1E 7HT, England). *Br. J. Exp. Pathol.* 58(4):352-358; 1977.

Five chimpanzees found to be seronegative for hepatitis A by immune electron microscopy and by radioimmunoassay were inoculated with known infective fecal extracts from several sources, including the MS-1 strain of hepatitis A virus, first passage material from a chimpanzee, and a strain of hepatitis A virus obtained during a naturally-occurring outbreak of infection in Germany. Elevated serum transaminase levels were found in the chimpanzees about 19 days after inoculation. Virus particles were found in feces as early as 9 days after infection in one chimpanzee and by days 12 and 14 in the others. Excretion of virus continued for 9 to 19 days, and the maximum numbers of virus particles were found on the 17th to the 19th day after inoculation. The buoyant density in cesium chloride of virus particles separated from feces was 1.31 to 1.43 g/ml. Most of the particles were found in the fraction with a density of 1.34 g/ml. Hepatitis A antibody was detected in the serum by

immune electron microscopy and by radioimmunoassay during the period of incubation while virus particles were still being excreted in the feces and coinciding approximately with the onset of biochemical evidence of liver damage. A very close or identical morphological and serological relationship was demonstrated between hepatitis A virus isolated from man and from the experimentally infected chimpanzees. The chimpanzee is a realistic source of hepatitis A virus for biophysical and biochemical characterization of the virus and for the development and application of serological tests.

4444 EXPERIMENTAL LIVER NECROSIS: HEPATIC ERYTHROCYTE SEQUESTRATION AS A CAUSE OF ACUTE ANEMIA. (Eng.) Miller, D. J.; Pichanick, G. G.; Fiskerstrand, C.; Saunders, S. J. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Dig. Dis.* 22(12):1055-1059; 1977.

The cause of the acute anemia previously observed in pigs manifesting acute liver necrosis after the administration of acetaminophen in dosages in excess of the LD_{100} was investigated. Liver damage was produced in phenobarbital (45 mg/kg for 3 days, i.m.)-pretreated pigs by the administration of acetaminophen by gavage (1.1 g/kg). A highly significant correlation was found between the degree of anemia and the increase in liver weight ($p<0.001$), and a similarly significant correlation was noted between the increase in liver weight and the ^{51}Cr activity in the liver after the administration of autologous ^{51}Cr-labeled RBC. Marked hepatic RBC sequestration was confirmed histologically, whereas there was minimal RBC accumulation in extrahepatic tissue. The RBC glutathione content was not altered by acetaminophen administration. It is concluded that hepatic sequestration of RBC occurred to a sufficient extent to account for the precipitous fall in hematocrit.

4445 CARBOHYDRATE METABOLISM AND ITS ZONATION IN RAT LIVER PARENCHYMA DURING REGENERATION AFTER PARTIAL HEPATECTOMY [Abstract]. (Eng.) Brinkman, A.; Katz, N.; Sasse, D.; Jungermann, K. (Biochemisches Institut der Universitat, Hermann-Herder-Str. 7, D-7800 Freiburg i. Br., W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1184; 1977.

4446 METABOLITE COMPARTMENTATION IN ISOLATED LIVER CELLS FROM FED RATS [Abstract]. (Eng.) Brocks, D. G.; Siess, E. A.; Wieland, O. H. (Krankenhaus Munchen-Schwabing, Kolner Platz 1, D-8000 Munchen 40, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1185; 1977.

4447 RIBOSOMAL PROTEIN PHOSPHORYLATION IN EXPERIMENTAL LIVER INJURY [Abstract]. (Eng.) Gressner, A. M. (Medizinischen Fakultat der RWTH, Goethe-str. 27-29, D-5100 Aachen, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1207; 1977.

4448 HEMATOSIDE-ACETYLGALACTOSAMINYLTRANSFERASE ACTIVITY IN THE GOLGI APPARATUS OF D-GALACTOSAMINE-TREATED RAT LIVER [Abstract]. (Eng.) Rossle, M.; Kloust, R.; Decker, K. (Medizinischen Fakultat der Albert-Ludwigs-Universitat, Hermann-Herder-Str. 7, D-7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1265-1266; 1977.

4449 THREE-DIMENSIONAL MAPPING OF METABOLIC STATE OF RAT LIVER. EFFECTS OF HIGH AND LOW ALCOHOL CONCENTRATIONS [Abstract]. (Eng.) Quistorff, B.; Chance, B. (Johnson Res. Foundation, Univ. Pennsylvania, Philsdelphia, PA 19174). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1261; 1977.

4450 DEVELOPMENT OF LIVER DAMAGE INDUCED BY D-GALACTOSAMINE STUDIED IN THE ISOLATED PERFUSED RAT LIVER [Abstract]. (Eng.) Rasenack, J.; Nowack, J.; Decker, K. (Medizinischen Fakultat der Universitat, Hermann-Herder-Str. 7, 7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1262; 1977.

4451 THE ROLE OF ACETATE IN THE PATHOGENESIS OF THE ACUTE ETHANOL-INDUCED FATTY LIVER IN RATS [Abstract]. (Eng.) Morgan, D. D.; Mendenhall, C. L. (Univ. Cincinnati Medical Center, Cincinnati, OH). *Gastroenterology* 73(5):1235; 1977.

4452 THE EFFECT OF β-GLYCEROPHOSPHATE ON CHOLESTEROL SATURATION AND BILIARY LIPID KINETICS IN NORMAL MAN [Abstract]. (Eng.) McCone, J.; Trotman, B. W.; Soloway, R. D. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 73(5):1233; 1977.

4453 EFFECTS OF NICOTINIC ACID ON BILIARY LIPIDS IN MAN [Abstract]. (Eng.) Mok, H. Y. I.; Grundy, S. M. (Veterans Admin. Hosp., La Jolla, CA). *Gastroenterology* 73(5):1235; 1977.

4454 DISPARATE Na^+-REQUIREMENT OF BILE ACID INDOCYANINE GREEN UPTAKE BY ISOLATED HEPATOCYTES [Abstract]. (Eng.) Minder, E.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 73(5):1235; 1977.

4455 KINETICS OF UREA SYNTHESIS BY PERFUSED RAT LIVER [Abstract]. (Eng.) Perez, G. O.; Schiff, E. R.; Rietberg, B.; Owens, B.; Parker, T. (Univ. Miami Sch. Medicine, Miami, FL). *Gastroenterology* 73(5):1238; 1977.

4456 CHARCOAL HEMOPERFUSION (CHP) AND BRAIN NEUROTRANSMITTERS (BNT) IN EXPERIMENTAL LIVER FAILURE [Abstract]. (Eng.) Opolon, P.; Javaudin, L.; Delorme, M. L.; Boschat, M.; Rapin, J. R. (INSERM U 9, 75012 Paris, France). *Gastroenterology* 73(5):1237; 1977.

4457 HEPATIC LIPOPEROXIDATION (HLP) IN RELATION TO AGE AND DIETARY FACTORS IN RATS [Abstract]. (Eng.) Porta, E. A.; Joun, N. S. (J. A. Burns Medical Sch., Honolulu, HI). *Gastroenterology* 73(5):1239; 1977.

4458 EFFECTS OF URSODEOXYCHOLIC ACID ON STEROL METABOLISM IN RATS [Abstract]. (Eng.) Raicht, R. F.; Cohen, B. I. (New York Veterans Admin Hosp., New York, NY). *Gastroenterology* 73(5):1241; 1977.

4459 THE FRACTIONAL HEPATIC EXTRACTION OF CHOLIC ACID CONJUGATES IN THE CONSCIOUS DOG [Abstract]. (Eng.) Pries, J. M.; Sherman, C. A.; Williams, G. C.; Hanson, R. F. (Dept. Medicine, Univ. Minnesota, Minneapolis, MN). *Gastroenterology* 73(5):1240; 1977.

4460 INHIBITION OF BILIRUBIN CONJUGATION AND INDUCTION OF HYPERBILIRUBINEMIA BY NICOTINIC ACID [Abstract]. (Eng.) Rosental, E.; Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1244; 1977.

4461 THE EFFECT OF SIMULATED RESPIRATORY ACIDOSIS AND ALKALOSIS ON INTRACELLULAR pH AND GLUCONEOGENESIS FROM LACTATE IN THE ISOLATED PERFUSED RAT LIVER [Abstract]. (Eng.) Iles, R. A.; Baron, P. G.; Cohen, R. D. (London Hosp. Medical Coll., London, England). *Clin. Sci. Mol. Med.* 53(3):9P-10P; 1977.

4462 PREVENTION, AUGMENTATION AND REVERSAL OF TAUROLITHOCHOLIC ACID (L) CHOLESTASIS IN THE MONKEY [Abstract]. (Eng.) Strasberg, S. M.; Ilson, R. G. (Dept. Surgery, Univ. Toronto, Toronto, Canada). *Gastroenterology* 73(4):869; 1977.

4463 CHLORPROMAZINE (CPZ) CHOLESTASIS: SITE OF INJURY AND PROTECTIVE EFFECT OF SODIUM TAUROCHOLATE (TC) [Abstract]. (Eng.) Strasberg, S. M.; Ilson, R. G. (Dept. Surgery, Univ. Toronto, Toronto, Canada). *Gastroenterology* 73(4):869; 1977.

4464 EFFECT OF CHRONIC ETHANOL ADMINISTRATION MECHANISMS OF HEPATOTOXICITY TO FOREIGN COMPOUNDS [Abstract]. (Eng.) Joly, J. G.; Yelle, L.; Hetu, C. (Hopital Saint-Luc, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

4465 ALTERATIONS OF THE ACTIVITIES OF LIVER PLASMA MEMBRANE ENZYMES AND MECHANISM OF SERUM ALKALINE PHOSPHATASE ELEVATION IN CHOLESTASIS OF RAT [Abstract]. (Eng.) Oka, H.; Toda, G. (First Dept. Medicine, Univ. Tokyo, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):336-337; 1977.

4466 INHIBITION OF HEPATOMA GROWTH IN RATS TREATED WITH PROPYLTHIOURACIL (PTU) [Abstract]. (Eng.) Mishkin, S.; Morris, H. P.; Lenoff, F.; Pollack, R.; Yalovsky, M.; Murthy, P. V. (McGill Univ. Clinic, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

4467 BILIARY TRANSPORT AND CHOLESTATIC EFFECTS OF AMINO ACIDS (AA) [Abstract]. (Eng.) Preisig, R.; Rennert, O. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 73(5):1240; 1977.

4468 PROLINE OXIDASE ACTIVITY AND THE AVAILABILITY OF PROLINE FOR COLLAGEN BIOSYNTHESIS IN LIVERS OF CCl_4-TREATED RATS [Abstract]. (Eng.) Rojkind, M.; Giambrone, M. A.; Ehrinpreis, M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1243; 1977.

4469 THE MECHANISM OF ALTERATION OF LIPID METABOLISM BY PORTACAVAL SHUNT [Abstract]. (Eng.) Reichle, F. A.; Reichle, R. M.; David, J. S. K. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gastroenterology* 73(5):1243; 1977.

4470 EFFECT OF PARTIAL OR COMPLETE PORTAL DIVERSION ON LIVER MASS AND AMMONIA METABOLISM [Abstract]. (Eng.) Reichle, F. A.; Rao, N. S.; Reichle, R. M.; Chang, K. H. Y. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gastroenterology* 73(5):1242; 1977.

4471 THE DUAL EFFECT OF GLYCOCHOLATE (GC) ON HEPATIC DIHYDROXY BILE ACID (BA) EXCRETION [Abstract]. (Eng.) Sarfeh, I. J.; Balint, J. A. (Albany Medical Coll., Albany, NY). *Gastroenterology* 73(5):1245; 1977.

4472 ACETALDEHYDE, DISULFIRAM, AND ALBUMIN SYNTHESIS [Abstract]. (Eng.) Oratz, M.; Schreiber, S. S. (Veterans Admin. Hosp., New York, NY). *Gastroenterology* 73(5):1244; 1977.

4473 LIVER GLYCOGEN AFTER PORTACAVAL SHUNT (PCS) [Abstract]. (Eng.) Rossouw, J. E.; Labadarios, D.; Vinik, A. I.; de Villiers, A. S. (Dept. Medicine, Univ. Stellenbosch, Stellenbosch, South Africa). *Gastroenterology* 73(5):1244; 1977.

4474 RIGHT HEMIHEPATECTOMY [Abstract]. (Eng./Ger.) Trede, M.; Raute, M.; Kersting, K. H.; Hebestreit, H. P. (Klinikum Mannheim der Universitat Heidelberg, Theodor-Kutzer-Ufer, D-6800 Mannheim, W. Germany). *Langenbecks Arch. Chir.* 345: 646; 1977.

4475 COMPARATIVE STUDIES OF ALANINE AND α-AMINOISOBUTYRIC ACID UPTAKE IN LIVER [Abstract]. (Eng.) Edmondson, J. W.; Lumeng, L.; Li, T. K. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Clin. Res.* 25(4):561A; 1977.

4476 CALCIUM AS A DETERMINANT OF HEPATOCYTE FUNCTION [Abstract]. (Eng.) Edmondson, J. W.; Lumeng, L.; Bang, N. U.; Li, T. K. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Clin. Res.* 25(4):561A; 1977.

4477 CLINICAL STUDY OF LIVER BLOOD FLOW IN MAN MEASURED BY ^{133}Xe CLEARANCE AFTER PORTAL VEIN INJECTION [Abstract]. (Eng.) Taylor, I.; Sheriff, S. B.; Smart, R. C. (Royal Hosp., Sheffield, England). *Gut* 18(5):A400; 1977.

4478 THE METABOLIC BASIS OF ALCOHOL'S TOXICITY. (Eng.) Lieber, C. S. (Mount Sinai Sch. Medicine, New York, NY). *Hosp. Prac.* 12(2):73-80; 1977.

4479 ANTIPYRINE (A) METABOLISM AND BILIARY EXCRETION DURING ISOLATED GUINEA PIG LIVER PERFUSION: EFFECT OF ALCOHOL [Abstract]. (Eng.) Tarnawski, A.; Bogdal, J.; Goszcz, A.; Wilczak, H. (Veterans Admin. Hosp., Columbia, MO). *Gastroenterology* 72(5, Part 2):1178; 1977.

4480 ABNORMAL COLLAGEN IN ALCOHOLIC LIVER INJURY [Abstract]. (Eng.) Feinman, L.; Lue, S.; Lieber, C. S. (Bronx Veterans Admin. Hosp., New York, NY). *Gastroenterology* 72(5, Part 2):1173; 1977.

4481 PLASMA BILE ACID DISAPPEARANCE RATE AS A TEST OF LIVER FUNCTION--A CRITICAL REASSESSMENT [Abstract]. (Eng.) Gilmore, I. T.; Thompson, R. P. H. (St. Thomas' Hosp., London, England). *Gut* 18(5):A402; 1977.

4482 HEPATIC UPTAKE OF BILE ACIDS (BA) BY THE ISOLATED PERFUSED RAT LIVER (IPRL) [Abstract]. (Eng.) Fisher, M. M.; Nagy, B. R.; Yousef, I. M. (Dept. Medicine, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2): 1058; 1977.

4483 EFFECTS OF ALTERED BILE SALT ENTEROHEPATIC CYCLING UPON BILE SALT KINETICS AND BILIARY LIPID COMPOSITION [Abstract]. (Eng.) Motson, R.; Hammerman, K.; Admirand, W.; Way, L. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1173; 1977.

4484 TREATMENT OF CANINE ACUTE LIVER FAILURE BY HETEROTOPIC LIVER HOMOGRAFT [Abstract]. (Eng.) Ricco, J. B.; Diaz, A.; Franco, D.; Grange, D.; Gigou, M.; Bismuth, H. (INSERM U 17, Hopital Paul-Brousse, 14, avenue Paul-Vaillant-Couturier, 94800 Villejuif, France). *Digestion* 15(5):444-445; 1977.

4485 BILE COMPOSITION AND 'BILE CAST' FORMATION AFTER LIVER TRANSPLANTATION IN MAN [Abstract]. (Eng.) McMaster, P.; Herbertson, B. M.; Calne, R. Y.; Williams, R.; Cusick, C. (Dept. Surgery, Univ. Cambridge, Cambridge, England). *Gut* 18(5):A403; 1977.

4486 BIOCHEMICAL CHANGES UNDER THE EFFECT OF CARBON TETRACHLORIDE INTOXICATION. (Eng.) El-Dessoukey, E. A.; Awadallah, R.; El-Attar, S. (Natl. Res. Center, Industrial Medicine, Dokki, Cairo, Egypt). *Z. Ernaehrungswiss.* 16(4): 217-222; 1977.

See also, 4347, 4382, 4413, 4520, 4540, 4564, 4647, 4805, 4806, 4839, 4929, 4945, 4961, 4966, 5004.

SECRETION AND METABOLISM

Intestine

4487 EVIDENCE FOR THE EXISTENCE OF A COUNTERCURRENT EXCHANGER IN THE SMALL INTESTINE IN MAN. (Eng.) Hallback, D. A.; Hulten, L.; Jodal, M.; Lindhagen, J.; Lundgren, O. (Dept. Physiology, Fack, 400 33 Goteborg 33, Sweden). *Gastroenterology* 74(4):683-690; 1978.

Fifty-one patients undergoing surgery for colorectal carcinoma, colitis, or obesity were studied by washout of intra-arterially injected ^{85}Kr or by cryoscopy of the tissue osmolality in the intestinal villi when exposed to electrolyte solutions to investigate the possibility that a

countercurrent exchanger exists in the human small intestine. The elimination of ^{85}Kr from an isolated segment of the small bowel in 40 patients exhibited an initial very rapid component, which probably reflects the extravascular shunting in the exchanger of the injected radioactive tracer. In the 11 patients whose intestinal mucosa were exposed to an isotonic electrolyte solution containing glucose, an osmolality gradient was observed from the tip to the base of the villi, the tips having an osmolality of 700 mOsm/kg water. It is suggested that the hyperosmolality observed is created by the exchanger acting as a countercurrent multiplier.

4488 DIFFERENTIATION AND AGING OF THE RAT INTESTINAL MUCOSA. II. MORPHOLOGICAL, ENZYME HISTOCHEMICAL AND DISC ELECTROPHORETIC ASPECTS OF THE AGING OF THE SMALL INTESTINAL MUCOSA. (Eng.) Hohn, P.; Wagner, R. (Inst. for Pathology, Johannes Gutenberg Univ., Mainz, W. Germany). *Mech. Ageing Dev.* 7(3):217-226; 1978.

To study the age-dependent loss of function in the intestinal mucosa, the small intestinal mucosa of 4-month-old (adult) and 30-month-old (senile) male Wistar rats was examined histologically by scanning electron microscopy, autoradiography, enzyme histochemistry, and disc electrophoresis. Specimens were obtained at 0800, 1200, 1600, and 2400 hr. By light microscopy, a pronounced atrophy of the duodenal mucosa (approximately a 25% decrease in villous height) was seen in the senile animals as compared to the controls. In the senile rats, villous atrophy was detected histologically, and an irregular architecture was seen in scanning electron microscopy. These age-dependent changes were limited to the proximal small intestine. In both 4-month-old and 30-month-old rats, ^{3}H-thymidine incorporation was restricted to the lower 2/3 of the crypts in the intestinal epithelium 1 hr after precursor administration, indicating that the length relation between the proliferation and differentiation compartments is identical in young and old animals. No appreciable difference between 4-month- and 30-month-old rats was demonstrable by enzyme histochemistry, but a marked loss in activity of alkaline and acid phosphatases in the duodenum of senile rats was shown in the disc electrophoretogram for specimens taken at all times of day. This loss of enzyme activity is attributed solely to the diminished total number of enterocytes in old age.

4489 THE MAGNITUDE AND DISTRIBUTION OF THE ACID MICROCLIMATE IN PROXIMAL JEJUNUM AND ITS RELATION TO LUMINAL ACIDIFICATION. (Eng.) Lucas, M. L.; Blair, J. A. (Dept. Chemistry, Univ. Aston in Birmingham, Birmingham B4 7ET, England). *Proc. R. Soc. Lond.* [*Biol.*] 200(1138):27-41; 1978.

The change in surface pH along the length of the rat and human small intestine and the response of the acid microclimate to various physiologic conditions were investigated and then correlated with the luminal acidification that occurs in the proximal jejunum. The pH of the intestinal surface was measured in rat jejunum and ileum and in human jejunal biopsy samples by a sensitive glass pH-electrode. In the absence of glucose in the incubation medium, pH values were between 6.5 and 6.7 with slightly more acidic values in the jejunum, indicating a glucose-independent maximum for surface pH around the mid-portion of the small intestine. In the presence of 10 mM glucose, there was maximum acidity in the duodenum and a distally increasing surface pH. Values in the presence of glucose were significantly different (more acidic) from the glucose-free values except in the distal ileum, indicating a glucose-sensitive component of surface pH maintenance. The low surface pH was less acid in the presence of 10 mM mucosal aminophylline or ouabain. Various intestinal preparations were used to investigate the site of acidification and simultaneously mucosal lactic and pyruvic acid production were measured. It is concluded that the mucosal cells are the site of acidification when they are correctly aligned, as they would be in the intact villus, and that lactic and pyruvic acid production are not involved in the process. The ouabain and aminophylline-inhibited serosal acidification seen in everted intestinal sacs was less than 2% of that occurring mucosally. It may be accounted for solely by back diffusion of hydrogen ion from the mucosal surface.

4490 CHYLOMICRON APOPROTEIN LOCALIZATION WITHIN RAT INTESTINAL EPITHELIUM: STUDIES OF NORMAL AND IMPAIRED LIPID ABSORPTION. (Eng.) Glickman, R. M.; Kilgore, A.; Khorana, J. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY). *J. Lipid Res.* 19(2):260-268; 1978.

Monospecific antisera were produced to two chylomicron apoproteins (apoB, apoA-I) and utilized for indirect immunofluorescent localization of these apoproteins within rat intestinal epithelium during normal and impaired lipid absorption. Isolated intestinal epithelial cells prepared after different periods of lipid absorption from *in situ* intestinal segments revealed a rapid increase in fluorescence for both apoproteins that filled the entire apical portion of the cell. Prolonged lipid absorption for as long as 5 hr demonstrated sustained immunofluorescence and gave no indication of a depletion of the intestinal mucosa for either apoprotein during normal lipid absorption. [^{3}H]Leucine incorporation into mesenteric lymph chylomicron apoproteins showed a linear decrease in specific activity of total chylomicron protein as well as apoB over 4 hr of a continuous lipid infusion, indicating sustained active apoprotein synthesis during prolonged lipid absorption. In animals in which protein synthesis was inhibited by the administration of acetoxycycloheximide (0.25-0.5 mg/kg, i.p.), fluorescence for both apoproteins was present early in the course of lipid absorption; however, at 60 min after the onset of lipid absorption, fluorescence for both apoproteins was absent. Fluorescence for both apoproteins returned during the recovery of protein synthesis. These studies confirm previous results

that had localized two chylomicron apoproteins within intestinal epithelial cells. The present studies extend these observations and disclose a rapid and sustained synthesis of these apoproteins during prolonged chylomicron formation. During an experimental condition of impaired protein synthesis, there was a marked reduction in the mucosal content of both apoA-1 and apoB. These results are the first demonstration of impaired mucosal apoprotein synthesis during an experimental model of impaired lipid absorption.

4491 EFFECT OF CORTISONE OR L-TRIIODOTHYRONINE ADMINISTRATION TO PREGNANT RATS ON THE ACTIVITY OF FETAL INTESTINAL DISACCHARIDASES AND LYSOSOMAL ACID β-GALACTOSIDASE. (Eng.) Jumawan, J.; Celano, P.; Horowitz, C.; Lau, H.; Koldovsky, O. (Children's Hosp. Philadelphia, Philadelphia, PA). *Biol. Neonate* 32(3/4):211-217; 1977.

To clarify factors influencing the expression of the normal developmental pattern, the effects of cortisone acetate (10 or 50 mg/100 g/day, i.m.) or *L*-triiodothyronine (T_3, 20 or 50 µg/100 g/day, s.c.) administration to pregnant Charles River rats on fetal jejunal and ileal sucrase, maltase, lactase, and acid-β-galactosidase activities were studied. The injections were administered on days 16-21 of pregnancy and the fetuses taken by cesarean section on the morning of day 22; the fetuses were killed by decapitation, and the jejuna and ilea of fetuses from one horn were pooled and prepared for assay. Cortisone administration (10 or 50 mg/kg/day) markedly decreased maternal weight gain (38.2 ± 3.1 and 20.2 ± 8.3 g, resp.) compared to controls (70.8 ± 4.3 g for untreated and 61.4 ± 1.4 g for NaCl-injected animals), while T_3 treatment (20 or 50 µg/kg/day) reduced weight gain to a lesser extent (59.3 ± 9.8 and 57 g, resp.) compared to the untreated or NaOH-treated (63.8 ± 4.2 g) controls. Litter weight was notably affected only by the higher cortisone dose (32.5 ± 4.2 g versus 55.4 ± 4.1 and 50.4 ± 1.3 g for the untreated and NaCl-treated controls, resp.). The higher cortisone dose decreased both ileal and jejunal weights (2.02 ± 0.09 and 3.92 ± 0.21 mg protein, resp.) compared to untreated (2.48 ± 0.09 and 5.22 ± 0.30 mg protein, resp.) and NaCl controls (2.62 ± 0.13 and 4.83 ± 0.22 mg protein, resp.), but the lower cortisone dose affected only the jejunum (3.81 ± 0.24 mg protein). The lower T_3 dose increased ileal weight (5.55 ± 0.47 mg protein) compared to untreated and NaOH (4.08 ± 0.45 mg protein) controls. There were no significant differences in the activity of any enzyme among the three control groups in either tissue, except that NaCl treatment increased the ileal lactase specific activity by 43% and total activity (in µmol glucose/hr/ileum) from 4.23 ± 0.26 (untreated controls) to 6.39 ± 0.63. Sucrase and maltase specific and total activities were markedly increased in both the jejunum and ileum by both hormone treatments in a dose-dependent manner. Cortisone acetate, but not T_3, increase lactase specific and total activities. Both T_3 doses markedly decreased jejunal acid-β-galactosidase specific and total activities, whereas cortisone had no effect. The administration of hormones to pregnant mothers is able to influence the intestinal enzyme activity of their offspring *in utero*.

4492 THERMOGRAPHIC ASSESSMENT OF INTESTINAL VIABILITY FOLLOWING ISCHEMIC DAMAGE. (Eng.) Moss, A. A.; Kressel, H. Y.; Brito, A. C. (Dept. Radiology, Univ. California, San Francisco, CA 94143). *Invest. Radiol.* 13(1):16-20; 1978.

The use of thermography in assessing the viability of ischemic intestine that has been revascularized was investigated in dogs. A segment of small bowel was made ischemic by arterial occlusion, and the ischemia was maintained for 2.5 hr (ischemic, viable bowel) or 8 hr (ischemic, nonviable bowel) before circulation was restored. Thermograms and surface temperature measurements of exposed ischemic and nonischemic bowel segments were obtained before and every 5 min after revascularization. Thermograms of segments revascularized after 2.5 hr of ischemia demonstrated reactive hyperemia and a 1- to 4-degree increase in surface temperature compared to normal surrounding bowel. No hyperemic response was seen in bowel segments that were ischemic for 8 hr. These results indicate that thermograms can document reactive hyperemia of an exposed ischemic bowel that has been successfully revascularized and may be an important aid in assessing bowel viability during surgery.

4493 EXPERIMENTAL PRODUCTION OF DIFFUSE COLITIS IN RATS. (Eng.) MacPherson, B.; Pfeiffer, C. J. (Faculty Medicine, Memorial Univ. Newfoundland, St John's, Newfoundland, Canada). *Digestion* 17(2):135-150; 1978.

Two modifications of the acetic acid technique (serosal application and intraluminal application) were used in 450 male Sprague-Dawley rats in an effort to develop colonic mucosal lesions that were located in the distal colon, readily reproducible, of diffuse character, and exhibited features histopathologically similar to human disease forms. The various concentrations of acetic acid (10, 25, 35, or 50%) tested yielded a dose-response relationship. The optimal concentration of acetic acid for serosal application (35%) produced the desired lesions in 100% of the treated animals but caused production of vast amounts of fibrous connective tissue exudate on the visceral aspect of the serosa resulting in adhesions encompasssing the adjacent viscera and fistulous tracts between the colon and small bowel segments. Gross dilation of the distal colon resembling megacolon was also observed. The optimal intraluminal application (10%) was equally effective at inducing colonic mucosal lesions without the adverse side-effects. The histopathological features of the chemically induced colitis were diffuse ulceration of the distal colon, decreased colonic mucus secretion, the formation of pseudopolyp-like structures, increase in intestinal crypt depth (474 ± 1.58 µm versus a normal value of 229 ± 1.19 µm), and acute, edematous, nonspecific, transmural inflammation. A return to normal ar-

chitecture was observed during healing following 10% intraluminal acetic acid treatment, whereas most other treatments caused the formation of fibrous scar tissue. The experimental lesions were not observed to reactivate during 60 days of follow-up. It is concluded that intraluminal application was a superior technique for induction of experimental colitis.

4494 PROTECTIVE EFFECT OF METRONIDAZOLE IN EXPERIMENTAL ULCERATIVE COLITIS. (Eng.) Onderdonk, A. B.; Hermos, J. A.; Dzink, J. L.; Bartlett, J. G. (Boston Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *Gastroenterology* 74(3):521-526; 1978.

Carrageenan-induced colitis in guinea pigs was used as a model to determine fecal flora changes and response to antimicrobial probes during the evolution of colitis. Mean coliform concentrations increased from $10^{2.7}$ to $10^{7.4}$/g during the initial stages of colonic ulceration produced by 5% carrageenan (weight/volume) as drinking fluid. Pretreatment of carrageenan recipients with antimicrobials directed against coliforms reduced the concentrations of these organisms, but failed to attenuate the disease process. On the other hand, pretreatment with metronidazole (2 mg/ml in drinking water) prevented carrageenan-induced colitis in 12 of 15 animals. Delayed treatment with metronidazole until after colitis was established showed no salutory benefits. These results suggest that anaerobic bacteria play a role in the initial events of carrageenan-induced colitis in the guinea pig model.

4495 STUDY OF THE INTESTINAL MUCOSA IN THE PRESENCE OF EXPERIMENTALLY INDUCED ATRESIA. (Eng.) Pospisilova, V.; Pavlikova, D.; Terstianska, G. (Faculty Medicine, Comenius Univ., Bratislava, Czechoslovakia). *Fol. Morphol.* 25(4):329-332; 1977.

4496 REABSORPTION OF DIGESTIVE ENZYMES: PLAYING WITH POISON. (Eng.) Diamond, J. M. (Univ. California Medical Center, Los Angeles, CA). *Nature* 271(5641):111-112; 1978.

4497 THE SMALL INTESTINE IN OLD MICE: GROWTH, ALKALINE PHOSPHATASE AND DISACCHARIDASE ACTIVITIES, AND DEPOSITION OF AMYLOID. (Eng.) Moog, F. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *Exp. Gerontol.* 12(5/6):223-235; 1977.

4498 RELATION OF PEROXIDASE ACTIVITY IN GUT MUCOSA TO INFLAMMATION. (Eng.) Smith, J. W.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX 77025). *Am. J. Physiol.* 234(1):R72-R79; 1978.

4499 DIATRIZOATE ENEMAS: FACTS AND FALLACIES OF COLONIC TOXICITY. (Eng.) Wood, B. P.; Katzberg, R. W.; Ryan, D. H.; Karch, F. E. (Univ. Rochester Medical Center, 601 Elmwood Ave., Rochester, NY 14642). *Radiology* 126(2):441-444; 1978.

4500 INTESTINAL BRUSH BORDER ENZYME RELEASE IN RATS [Abstract]. (Eng.) Eloy, P.; Mirhom, R.; Raul, F.; Vaultier, J. P.; Grenier, J. F. (INSERM, U-61, Avenue Moliere, Strasbourg Hautepierre 67200, France). *Digestion* 16(1/2):209-210; 1977.

4501 REGULATION OF SECRETIN RELEASE BY GASTRIC ACID [Abstract]. (Eng.) Schaffalitzky de Muckadell, O. B.; Fahrenkrug, J. (Bispebjerg Hosp., Copenhagen NV, Denmark). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):487-488; 1977.

4502 FORMATION OF LITHOCHOLIC ACID FROM CHENODEOXYCHOLIC ACID AND URSODEOXYCHOLIC ACID BY INTESTINAL BACTERIA [Abstract]. (Eng.) Fedorowski, T.; Salen, G.; Mosbach, E. H. (East Organge Veterans Admin. Hosp., East Orange, NJ). *Gastroenterology* 73(5):1220; 1977.

4503 INTESTINAL BYPASS IN RATS. (Eng.) Viddal, K. O.; Nygaard, K. (Natl. Hosp. Norway, Oslo, Norway). *Chir. Gastroenterol.* 11(2):213-215; 1977.

4504 HISTOGENESIS OF COLON GLANDS DURING POSTNATAL GROWTH. (Eng.) Maskens, A. P. (Clinique Saint-Michel, Rue de Lantsheere 19, 1040 Brussels, Belgium). *Acta Anat.* 100(1):17-26; 1978.

4505 INTESTINAL ANTIBODIES. (Eng.) Walker, W. A.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA). *N. Engl. J. Med.* 297(14):767-773; 1977.

4506 ORIGIN OF INTESTINAL β-GLUCURONIDASE IN GERMFREE, MONOCONTAMINATED AND CONVENTIONAL RATS. (Eng.) Rod, T. O.; Midtvedt, T. (Rikshospitalet, Oslo, Norway). *Acta Pathol. Microbiol. Scand.* [B] 85(4):271-276; 1977.

4507 EFFECT OF ADRENALECTOMY (ADX) ON PHOSPHOLIPID BIOSYNTHESIS IN RAT INTESTINE [Abstract]. (Eng.) O'Doherty, P. J. A. (Vancouver General Hosp., Vancouver, British Columbia, Canada). *Clin. Res.* 25(5):689A; 1977.

4508 BIOSYNTHESIS OF GLYCOPROTEINS ASSOCIATED WITH ENZYMIC ACTIVITIES BY HUMAN INTESTINAL MUCOSA IN ORGAN CULTURE [Abstract]. (Eng.) Kedinger, M.; Hauri, H. P.; Haffen, K.; Grenier, J. F.; Hadorn, B. (INSERM, U-61, Avenue Moliere,

67200 Strasbourg, France). *Digestion* 16(1/2): 212; 1977.

4509 RELEASE OF NEUROTENSIN-LIKE IMMUNOREACTIVITY (NTLI) FROM THE CANINE GUT [Abstract]. (Eng.) Rosell, S.; Mashford, M. L.; Nilsson, G.; Rokaeus, A. (Karolinska Institutet, Stockholm S-10401, Sweden). *Fed. Proc.* 37(3):373; 1978.

4510 ANION-STIMULATED ATPase ACTIVITY OF INTESTINAL ALKALINE PHOSPHATASE [Abstract]. (Eng.) Humphreys, M. H.; Watson, J. B.; Kaysen, G. A. (San Francisco General Hosp., San Francisco, CA). *Clin. Res.* 26(2):110A; 1978.

4511 STIMULATION OF INTESTINAL ORNITHINE DECARBOXYLASE (OD) BY EPIDERMAL GROWTH FACTOR (EGF) [Abstract]. (Eng.) Feldman, E. J.; Aures-Fischer, D.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 26(2):109A; 1978.

4512 IMMUNOREACTIVE SECRETIN IS RELEASED INTO THE DUODENAL JUICE IN MAN [Abstract]. (Eng.) Hanssen, L. E.; Hanssen, K. F.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):493; 1977.

4513 RELEASE OF SECRETIN IN RELATION TO VARIATIONS IN DUODENAL pH [Abstract]. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O.; Rune, S. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):486; 1977.

4514 ELECTRON-MICROSCOPIC STUDIES OF THE MUCOSA OF THE COLON IN RATS WITH CHRONIC ULCEROUS HAEMORRHAGIC COLITIS [Abstract]. (Eng.) Djadjova-Boneva, M.; Stoyanov, D. (Inst. Gastroenterology, Medical Acad., Sofia, Bulgaria). *Dokl. Bolg. Nauk* 30(10):1511-1514; 1977.

4515 IMMUNE-COMPLEX MEDIATED COLITIS IN RABBITS: AN EXPERIMENTAL MODEL. (Eng.) Hodgson, H. J. F.; Potter, B. J.; Skinner, J.; Jewell, D. P. (Royal Free Hosp., London, England). *Gut* 19(3): 225-232; 1978.

4516 CIRCADIAN RHYTHM IN THE ORNITHINE DECARBOXYLASE ACTIVITY OF RAT SMALL INTESTINE [Abstract]. (Eng.) Fujimoto, M.; Kanaya, A.; Nakabou, Y.; Hagihira, H. (Sch. Medicine, Tokushima Univ., Kuramoto-cho, Tokushima, Tokushima 770, Japan). *J. Biochem.* 83(1):237-242; 1978.

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4518 DISACCHARIDASES [sic] LEVELS IN THE SMALL INTESTINE OF UNDERNOURISHED RATS [Abstract]. (Eng.) Galvao, L. C.; do Rosario Leme Brasil, M.; Collares, E. F.; Soares, F. C. (No affiliation given). *Arq. Gastroenterol.* 14(3): 157; 1977.

4519 BINDING OF LONG-CHAIN FATTY ACIDS (FA) BY RAT INTESTINAL MICROVILLUS MEMBRANES (MVM) [Abstract]. (Eng.) Kessler, J. I.; Kvapil, V.; Kurylo, M. (McGill Univ. Clinic, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

4520 KALLIKREIN RELEASE FROM RAT DUODENUM STIMULATED BY BILE ACIDS AND OTHER FACTORS [Abstract]. (Eng.) Frankish, N. H.; Zeitlin, I. J. (Dept. Physiology and Pharmacology, Univ. Strathclyde, Glasgow G1 1XW, Scotland). *J. Physiol. (Lond.)* 273(2):60P-61P; 1977.

4521 CELL CYCLE IN MOUSE INTESTINAL CRYPTS DURING HALOTHANE OR NITROUS OXIDE ANAESTHESIA. (Eng.) Kuramoto, T.; Takahashi, M. (Yamaguchi Univ., Sch. Medicine, Ube, Yamaguchi, Japan). *Br. J. Anaesth.* 49(11):1075-1080; 1977.

4522 THE EFFECT OF INTRAUTERINE GROWTH RETARDATION (IUGR) AND POSTNATAL MALNUTRITION ON THE DEVELOPMENT OF INTESTINAL BRUSH BORDER ENZYMES [Abstract]. (Eng.) Lebenthal, E.; Hatch, T.; Chrzanowska, B.; Krasner, J.; Nitzan, M.; Branski, D.; Schulman, J. (Children's Hosp. Buffalo, State Univ. New York, Buffalo, NY). *Clin. Nutr.* 31(4): 695; 1978.

4523 THE METABOLISM OF LITHOCHOLIC ACID-3α-SULFATE BY HUMAN INTESTINAL MICROFLORA. (Eng.) Kelsey, M. I.; Muschik, G. M.; Sexton, S. A. (Natl. Cancer Inst. Frederick Cancer Res. Center, P.O. Box B, Frederick, MD 21701). *Lipids* 13(2):152-157; 1978.

4524 CELL POPULATION KINETICS IN THE EPITHELIUM OF THE COLON OF THE MALE RAT. (Eng.) Sunter, J. P.; Wright, N. A.; Appleton, D. R. (Dept. Pathology, Univ. Newcastle upon Tyne, Queen Victoria Rd., Newcastle upon Tyne NE1 4LP, England). *Virchows Arch. [Cell Pathol.]* 26(3): 275-287; 1978.

4525 THE DIURNAL VARIATION OF MITOTIC RESPONSE IN THE EPITHELIUM AT THE EDGE OF ACUTE

SECRETION AND METABOLISM

ULCERS IN THE RECTAL MUCOUS MEMBRANE OF GUINEA-PIGS. (Eng.) Reeve, D. R. E. (London Hosp. Medical Coll., Turner St., London E1 2AD, England). *J. Anat.* 125(2):337-348; 1978.

4526 EFFECT OF PARATHYROIDECTOMY ON THE FASTING-REFEEDING RESPONSE IN THE RAT COLON. (Eng.) Stragand, J. J.; Hagemann, R. F. (Allegheny General Hosp., 320 E. North Ave., Pittsburgh, PA 15212). *Experientia* 34(2):189-190; 1978.

See also, 4288, 4296, 4305, 4316, 4402, 4407, 4415, 4539, 4540, 4546, 4552, 4555, 4599, 4683, 4779, 4794, 5013.

GENERAL

4527 EFFECT OF ORAL PANCREATIC ENZYMES ON THE COURSE OF CHOLERA IN PROTEIN-DEFICIENT VERVET MONKEYS. (Eng.) Gyr, K.; Felsenfeld, O.; Zimmerli-Ning, M. (Kantonsspital, CH-4004 Basel, Switzerland). *Gastroenterology* 74(3):511-513; 1978.

The effect of pancreatic extract on the course of cholera infection in protein-deficient vervet monkeys (*Cercopithecus ethiops*) was studied. Eleven animals were made protein deficient by a protein-free diet. Their intestinal pancreatic enzyme concentration decreased as they became protein depleted. These animals and four controls on a normal diet were then challenged with *Vibrio cholerae*. Immediately after challenge, six protein-deficient monkeys were given a highly purified pancreatic extract (500 mg/day), and the other five protein-deficient animals received heat-inactivated pancreatic extract. Pancreatic extract significantly reduced the severity and duration of diarrhea in the treated animals so that they resembled the controls. The period of fecal excretion of vibrios was prolonged in the monkeys that received inactivated pancreatic extract. In addition, the response of intestinal antibody titers to cholera toxin was also significantly lower in this latter group ($p<0.01$). These observations suggest that exocrine pancreatic secretion is involved in the local defense mechanism against cholera during protein deficiency.

4528 PATHOGENIC EFFECT OF ENTEROTOXIGENIC *Escherichia coli* AND *Escherichia coli* CAUSING INFANTILE DIARRHOEA. (Eng.) Polotsky, Yu. E.; Dragunskaya, E. M.; Seliverstova, V. G.; Avdeeva, T. A.; Chakhutinskaya, M. G.; Ketyi, I.; *et al.* (USSR Acad. Medical Sciences, Kirovsky prospekt 69/71 Leningrad P-22, 197022, USSR). *Acta Microbiol. Acad. Sci. Hung.* 24(3):221-236; 1977.

Macroscopic and light and electron microscopic alterations were investigated in ligated rabbit intestinal loops challenged with five standard enterotoxigenic *Escherichia coli* (ETEC) strains and 23 enteropathogenic *E. coli* (EEC-I) strains freshly isolated from infantile enteritis cases. Only two of the EEC-I, 026:K60:H11 strains produced enterotoxin. Their living cultures, sterile filtrates of the fluid medium, and ultrasonic lysates of the bacteria resulted in pronounced hypersecretion of the intestinal epithelium followed by fluid accumulation and loop dilatation. These two *E. coli* strains, similar to other loop-negative EEC-I strains, were able to penetrate into the intestinal epithelium. In contrast to the standard ETEC strains, the EEC-I bacteria, adhered to the brush border, intruded into the microvilli, multiplied on the outer epithelial cell membrane (making close contact with it and causing shedding of microvilli), penetrated into enterocytes (becoming enclosed in membrane-bound phagosome-like vacuoles), appeared in the lamina propria, and elicited mild focal polymorphonuclear infiltration. Many features of enteropathogenic *E. coli* await elucidation.

4529 EFFECT OF SECRETOGOGUES ON MUCOSAL BLOOD FLOW IN THE ANTRUM AND CORPUS OF THE STOMACH. (Eng.) Taylor, T. V.; Pullan, B. R.; Goddard, J.; Torrance, B. (Royal Infirmary, Manchester, England). *Gut* 19(1):14-18; 1978.

The effect of increasing doses of secretagogues on mucosal blood flow to the antrum and corpus was studied in Wistar rats, using an indicator fractionation technique in which ^{86}Cl-Rb is employed. Antral and corpus flow rates were determined in response to increasing doses of pentagastrin (6-50 µg/kg) and histamine (0.08 mg/kg), and the effect of vagotomy was determined. With progressive stimulation, the antral corpus flow ratio increased with both stimulants; however, vagotomy and norepinephrine reduced blood flow in both areas of mucosa; norepinephrine reduced the flow rates to approximately 60% of the physiological basal flow. It is concluded that the antrum, as well as the corpus, actively responds to secretory stimulants by an increase in mucosal blood flow, and support is provided for the theory that the antrum plays an ac-

tive role in the control of parietal cell blood flow and secretion.

4530 SELECTIVE TRANSCATHETER EMBOLIZATION OF THE UPPER GASTROINTESTINAL TRACT: AN EXPERIMENTAL STUDY. (Eng.) Castaneda-Zuniga, W. R.; Jauregui, H.; Rysavy, J.; Amplatz, K. (Univ. Minnesota Hosp., 420 Delaware St. S.E., Minneapolis, MN 55455). *Radiology* 127(1):81-83; 1978.

The value of transcatheter gastric embolization using Ivalon shavings was tested in three groups of dogs. The left gastric artery and splenic branches (the short gastric and left gastroepiploic arteries) were embolized in group I, the left gastric artery in group II, and the splenic branches in group III. Infarctions of the gastric mucosa occurred only in group 1. Ischemic ulcers developed in three of the five dogs in group I and in one of the three dogs in group II. Since small particles may reach the capillary bed beyond the level of collateralization, embolization for the control of gastrointestinal hemorrhage can only be performed safely if particles of 0.3 mm or larger are used.

4531 VIP RELEASE IN INTESTINAL ISCHAEMIA [Abstract]. (Eng.) Modlin, I. M.; Bloom, S. R.; Mitchell, S. J. (Royal Postgraduate Medical Sch., London W12, England). *Gut* 18(11):A963; 1977.

4532 MATERNAL IMMUNITY TO Giardia IS PASSIVELY TRANSFERRED TO SUCKLING NEWBORN MICE [Abstract]. (Eng.) Stevens, D. P.; Frank, D. M. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH). *Clin. Res.* 25(4):609A; 1977.

4533 THE ACTIVITY OF A BENZOTHIOPYRANOINDAZOLE (IA-4 N-OXIDE) AGAINST Schistosoma mansoni INFECTION IN RHESUS MONKEYS. (Eng.) Reid, W. A.; Loizeaux, P. S.; Reardon, M. J. (Walter Reed Army Inst. Res., Washington, DC 20012). *Am. J. Trop. Med. Hyg.* 26(5, Part 1):937-943; 1977.

4534 EXPERIMENTAL OBSERVATIONS AND CLINICAL RECOMMENDATIONS ON VASOPRESSIN FOR CONTROL OF GASTROINTESTINAL HEMORRHAGE. (Eng.) Swan, K. G.; Hobson, R. W., II; Kerr, J. C. (New Jersey Medical Sch., 100 Bergen St., Newark, NJ 07103). *Am. Surg.* 43(9):545-553; 1977.

4535 IMMUNIZATION WITH Shigella dysenteriae TYPE 1: EVALUATION OF ANTITOXIC IMMUNITY IN PREVENTION OF EXPERIMENTAL DISEASE IN RHESUS MONKEYS (Macaca mulatta). (Eng.) McIver, J.; Grady, G. F.; Formal, S. B. (State Lab. Inst., 305 South St., Boston, MA 02130). *J. Infect. Dis.* 136(3):416-421; 1977.

4536 BENEFICIAL EFFECT OF OMENTAL WRAPPING OF UNSAFE INTESTINAL ANASTOMOSES: AN EXPERIMENTAL STUDY IN DOGS. (Eng.) Katsikas, D.; Sechas, M.; Antypas, G.; Floudas, P.; Moshovos, K.; Gogas, J.; *et al.* (King Paul's Hosp., Athens, Greece). *Int. Surg.* 62(8):435-437; 1977.

4537 EVIDENCE FOR A COMMON EVOLUTIONARY ORIGIN OF GASTRIN AND CHOLECYSTOKININ. (Eng.) Larsson, L. I.; Rehfeld, J. F. (Inst. Medical Biochemistry. Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Nature* 269(5626):335-338; 1977.

4538 NEW METHOD OF OBTAINING CINCHOPHEN ULCER IN DOGS. (Eng.) Nagamachi, Y. (1407 Amagawa-Ooshima, Apt. 5-104, Maebashi, Gunma-Ken 379-21, Japan). *Am. J. Dig. Dis.* 22(9):761-768; 1977.

4539 INDOMETHACIN-INDUCED INTESTINAL INFLAMMATION. (Eng.) Fang, W. F.; Broughton, A.; Jacobson, E. D. (Univ. Texas Medical Sch., Houston, TX 77030). *Am. J. Dig. Dis.* 22(9):749-760; 1977.

4540 ALKYLATED PURINES IN THE DNA OF VARIOUS RAT TISSUES AFTER ADMINISTRATION OF 1,2-DIMETHYLHYDRAZINE. (Eng.) Likhachev, A. J.; Margison, G. P.; Montesano, R. (N. N. Petrov Res. Inst. Oncology, 68, Leningradskaya St., Posjelok Pesochny-2, Leningrad 188646, USSR). *Chem. Biol. Interact.* 18(2):235-240; 1977.

4541 A SIMPLE TECHNIQUE FOR GASTRIC PARIETAL CELL VAGOTOMY IN THE RAT. (Eng.) Bapat, R. D.; Ferrie, M. M.; Joffe, S. N. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Experientia* 33(9): 1254-1255; 1977.

4542 VITAMIN B-6 DEFICIENCY IN GERMFREE RATS. (Eng.) Sumi, Y.; Miyakawa, M.; Kanzaki, M.; Kotake, Y. (Nagoya Univ. Sch. Medicine, Eisai Campus, Kawashima-cho, Hasima-gun, Gifu-ken, Japan). *J. Nutr.* 107(9):1707-1714; 1977.

4543 APPLICATION OF METAL LABELED ANTIBODY METHOD AND A CONSIDERATION OF THE FIXATIVES SUITABLE FOR IMMUNOHISTOCHEMISTRY STUDY. (Eng.) Yamamoto, N. (Sch. Medicine, Kitasato Univ., Sagamihara, Kanagawa 228, Japan). *Acta Histochem. Cytochem.* 10(2):246-252; 1977.

4544 SYSTEMIC PROTECTION AGAINST RADIATION. III. INCREASED INTESTINAL RADIORESISTANCE IN RATS FED A FORUMULA-DEFINED DIET. (Eng.) Pageau, R.; Bounous, G. (Centre Hospitalier Universitaire, Universite de Sherbrooke, Sherbrooke, Quebec, Canada). *Radiat. Res.* 71(3):622-627; 1977.

4545 PROTECTION AGAINST CHALLENGE WITH Escherichia coli HEAT-LABILE ENTEROTOXIN BY

IMMUNIZATION OF RATS WITH CHOLERA TOXIN/TOXOID. (Eng.) Pierce, N. F. (Baltimore City Hosp., Baltimore, MD). *Infect. Immun.* 18(2):338-341; 1977.

4546 INFLUENCE OF THE GASTRO-INTESTINAL MICROFLORA ON FOOD CONSUMPTION, BODY WEIGHT, PRODUCTION OF FACES [sic] AND URINE. (Eng.) Koopman, J. P.; Kennis, H. M.; Bremer-Mulder, W. G. M. (Central Animal Lab., Catholic Univ. Nijmegen, Geert Grooteplein Noord 2, Nijmegen, Netherlands). *Z. Versuchstierkd.* 19(4):215-221; 1977.

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DIAGNOSTIC PROCEDURES

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Preliminary results obtained with sequential hepatobiliary scintigraphy with ^{99m}Tc in the demonstration of duodenogastric and jejunogastric reflux following gastric surgery are presented. Following the i.v. injection of ^{99m}Tc, scans were taken at 5-min intervals during a 30-min period. The scintigraphy revealed marked differences from the x-ray contrast findings. While the x-ray method revealed marked duodenogastric reflux in 9/10 patients who underwent Billroth I gastric resection, the sequential scintigraphy showed fasting reflux in 1 patient only, and postprandial reflux in another patient after a test meal. Pronounced jejunogastric reflux was found in all patients who underwent Billroth II resection. Accumulation of radioactivity in the gastric stump was not observed following gastrojejunostomy with Roux-en-Y loop. The x-ray contrast investigation showed marked reflux in all 10 patients examined 1 week after selective proximal vagotomy, while sequential scintigraphy revealed marked reflux in only 1 patient who also underwent pyloroplasty, and only slight concentration of radioactivity in the stomach in 2 other patients. No duodenal regurgitation was seen in the other seven patients. Marked reflux was seen in two of these seven patients following a test meal. The findings indicate that this technique is especially suitable for the study of reflux following gastric surgery.

4557 THE CLINICAL VALUE OF AN ORAL TEST OF PANCREATIC FUNCTION WITH FLUORESCEIN DILAURATE. (Ger.) Kaffarnik, H.; Klimkeit, P.; Zofel, P.; Otte, U.; Meyer-Bertenrath, J. G. (Med. Poliklinik, Universitat Marburg, D-3550 Marburg/Lahn, W. Germany). *Munch. Med. Wochenschr.* 119(45):1467-1470; 1977.

The diagnostic value of an exocrine pancreas function test with orally administered fluorescein dilaurate was studied. Exocrine insufficiency of the pancreas is indicated by decreased splitting of the ester substrate and thus diminished excretion of fluorescein in the 24-hr urine. Unesterified fluorescein was used to ascertain the standard excretion of fluorescein (=100%). The relation of test excretion to standard excretion was expressed as a percentage. Values below 20% in the 24-hr or 10-hr urine were pathological, averaging 9.7% in patients with carcinoma of the pancreas and 13.5% in patients with other pancreatopathies, versus about 30% and higher in normal subjects. Values between 20% and 30% are questionable as to interpretation. False-positive test values were obtained in 5.6% and false negative findings in 1.3% of all cases. In view of its simplicity and the low frequency of false-negative results, the oral fluorescein dilaurate test is recommended as a screening method for pancreatic function.

4558 DEMONSTRATION OF THE HEPATIC VEINS BY ECHOTOMOGRAPHY. (Fre.) Taboury, J.; Tubiana, J. M.; Monnier, J. P. (Hopital Saint-Antoine, rue du Fg St-Antoine, F 75571 Paris Cedex 12, France). *Nouv. Presse Med.* 6(34): 3069-3078; 1977.

Provided that a rigorous protocol is adopted, exploration of the hepatic veins by grey-scale echotomography is always possible. The echotomogram of Budd-Chiari syndrome is characterized by hypertrophy of the caudate lobe (anterioposterior compression of the inferior vena cava) and disappearance of the normal suprahepatic venous network. The disposition of the suprahepatic veins is modified, and suprahepatic veins are absent in the pathological parenchymatous zones in hepatoma, liver metastases, hydatid cyst, and polycystosis of the liver. In liver cirrhosis, the walls of the veins are highly irregular and sinuous, or the vessels are very small (at the limit of resolution of the echotomography). The findings indicate that echotomography of the hepatic veins should be integrated into every echotomographic study of the liver (parenchyma, biliary tract, portal system, and inferior vena cava). The method is harmless, rapid, reproducible, and inexpensive.

4559 THE USE OF LIVER-SPLEEN SCAN FOR THE DIAGNOSIS OF CONGENITAL INTRAHEPATIC CYSTS OF THE BILE DUCT (M. CAROLI). (Ger.) Biersack, H. J.; Ebinger, H.; Kutz, K.; Siedeck, W.; Janson, R.; Lindstaedt, H.; *et al.* (Institut fur klinische und experimentelle Nuklearmedizin, Universitat Bonn, Bonn, W. Germany). *Roentgenblaetter* 29(6):289-293; 1976.

Liver-spleen scan with ^{99m}Tc sulfur colloid was performed in two 32-yr-old men with congenital intrahepatic cysts of the bile duct (Caroli's disease). The hepaticographic findings were compatible with, but not typical of, Caroli's disease in both cases. The liver-spleen scans revealed marked changes, such as hepatomegaly (in one case), atypical liver configuration with enlargement of the left hepatic lobe, and splenomegaly with increased colloid fixation. It was possible to localize exactly the intrahepatic cysts on the basis of the parenchymal storage defects. Additional ^{131}I-bromosulfon scintigraphy, performed in one case, proved to be a simple method for determining the patency of the bile ducts. The observations indicate the usefulness of preoperative and postoperative scintigraphy of the liver.

4560 VALUE OF WHOLE BODY COMPUTERISED AXIAL TOMOGRAPHY IN THE DIAGNOSIS OF LIVER DISEASE [Abstract]. (Eng.) Morris, A. I.; Fawcitt, R. A.; Marsh, M. N.; Isherwood, I. (Hope Hosp., Salford, England). *Gut* 18(5):A417; 1977.

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GASTROINTESTINAL DISEASES

ESOPHAGUS

4603 THE EFFICACY OF VASOPRESSIN IN THE TREATMENT OF DIGESTIVE HEMORRHAGES CAUSED BY RUPTURED ESOPHAGEAL VARICES: PRELIMINARY RESULTS OF A RANDOMIZED STUDY. (Fre.) Fourtanier, G.; Tournut, R.; Clanet, J.; Joncquiert, F.; Pascal, J. P. (Hopital de Purpan, 31052 Toulouse Cedex, France). *Therapie* 32(3):283-286; 1977.

The usefulness of vasopressin in the treatment of bleeding esophageal varices was studied in 24 severely cirrhotic patients with bleeding esophageal varices. The patients were randomly divided into 3 groups of 8. All patients were treated with a Linton-Nachlas hemostatic tube. Group 2 additionally received vasopressin intra-arterially (0.4 U/min) and group 3 received vasopressin i.v. Vasopressin did not improve the efficacy of the hemostatic tube and its effect lasted only as long as it was infused. Failures to stop the hemorrhage, recurrences, and deaths were fairly equally distributed among the three groups (2, 3, and 1; 3/6, 1/5, and 3/7; and 5, 5, and 4, resp.). No severe side-effects were associated with the drug at the administered dosage. This preliminary study, therefore, does not show any advantage in the use of vasopressin in addition to a hemostatic tube in the control of esophageal bleeding.

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ESOPHAGUS

Beneficencia Portuguesa, Sao Paulo, Brazil). *An. Paul. Med. Cir.* 104(2):113-118; 1977.

4618 DIAPHRAGMATIC HIATAL HERNIA: REPORT OF ONE CASE. (Fre.) Perrin-Fayolle, M.; Latarjet, M.; Lafont, J. P. (Hopital Sainte-Eugenie, 69230 Saint-Genis-Laval, France). *Poumon Coeur* 33(3):199-202; 1977.

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4620 HEMORRHAGIC ESOPHAGITIS: AN UNRECOGNIZED SOURCE OF BLEEDING IN THE POSTGASTRECTOMY PATIENT. (Fre.) Boutelier, Ph.; de Mestier, Ph. (Hopital Bichat, 170, bd Ney, F 75877 Paris Cedex 18, France). *Nouv. Presse Med.* 6(28):2495-2498; 1977.

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4622 FUNDOPLICATION AND ADDITIONAL PROXIMAL GASTRIC VAGOTOMY IN THE TREATMENT OF ESOPHAGEAL REFLUX. PRELIMINARY RESULTS. (Ger.) Regazzoni, P.; Ballmer, D.; Arma, S.; Muller, W.; Realini, S. (Spitaler Mendrisio und Bellinzona, Bellinzona, Switzerland). *Z. Gastroenterol.* 15(10):614-615; 1977.

4623 SPONTANEOUS ESOPHAGEAL RUPTURE: ENDOSCOPIC AND RADIOLOGICAL DIAGNOSIS. (Ita.) Franchesi, F.; Lesi, C.; Malagola, C. (Ospedali di Bologna, Bologna, Italy). *Boll. Sci. Med.* 149(2): 91-94; 1977.

4624 ATRAUMATIC COMPLETE ESOPHAGEAL RUPTURE (BOERHAVES'S SYNDROME). (Ger.) Zimmerman, F.; Gehl, H.; von Buch, K. G. (Kreiskrankenhaus, Eberhardstr. 20-26, D-7320 Goppingen, W. Germany). *Munch. Med. Wochenschr.* 119(41):1333-1336; 1977.

4625 PRELIMINARY EXPERIENCE WITH ENDOSCOPIC BOUGIENAGE FOR ESOPHAGEAL STENOSIS (BY MEANS OF EP-DILATATOR). (Ger.) Nuesch, H. J.; Kobler, E.; Otto, R.; Jenny, S.; Deyhle, P. (Kantonsspital, CH-8091 Zurich, Switzerland). *Z. Gastroenterol.* 15(10):616-617; 1977.

4626 ULCER OF OPERATED AND ARTIFICIAL ESOPHAGUS. (Rus.) Kharitonov, L. G. (Central Hosp. No. 1, Moscow, USSR). *Grudn. Khir.* (5):117-122; 1977.

4627 ULCERS OF THE NECK OF HIATAL HERNIA. REPORT OF EIGHT CASES. (Fre.) Viard, H.; Klepping, Cl.; Barault, J. F.; Cayot, M. (Hopital du Bocage, 21000 Dijon, France). *Chirurgie* 103(7): 518-531; 1977.

4628 COMPLICATIONS AFTER ESOPHAGEAL REPLACEMENT. (Ger.) Keminger, K.; Roka, R. (I. Chirurgische Universitatsklinik, A-1097 Alserstr. 4, Wien 9, Austria). *Zentralbl. Chir.* 102(18): 1136-1147; 1977.

4629 SEPTIC COMPLICATIONS IN ESOPHAGEAL SURGERY. (Ger.) Muller, E.; Kremer, K.; Nullen, H. (Chirurgische Universitatsklinik, Moorenstrasse 5, 4000 Dusseldorf, W. Germany). *Therapiewoche* 27(47):8446-8456, *passim;* 1977.

4630 USE OF A TWO-DUCT PROBE IN RECONSTRUCTIVE ESOPHAGEAL SURGERY. (Rus.) Mamontov, A. S.; Kukharenko, V. M. (P. A. Gertsen Scientific Res. Inst. Oncology, Moscow, USSR). *Khirurgiia (Mosk.)* (10):112-114; 1977.

See also, 4332, 4534, 4591, 4594, 4597, 4660, 4719, 4932, 4933, 4947, 4950, 5000, 5027, 5043, 5045.

STOMACH

4631 MORPHOLOGICAL FINDINGS OF DIFFERENT AREAS OF GASTRIC MUCOSA IN PATIENTS WITH ACHLORHYDRIA, EXTREME HYPOCHLORHYDRIA, NORMOCHLORHYDRIA AND THEIR RELATIONSHIP TO SERUM GASTRIN LEVEL: EVIDENCE FOR TWO DIFFERENT TYPES OF GASTRITIS. (Eng.) Massarrat, S.; Schmitz-Moormann, P.; Fritsch, W. P.; Hausamen, T. U.; Kappert, J. (Medizinische Univ.-Poliklinik, Emil Mannkopff-Strasse, D-3550 Marburg, W. Germany). *Klin. Wochenschr.* 55(22):1095-1102; 1977.

The morphological changes of gastric mucosa taken from different areas were studied in patients of approximately the same age with achlorhydria (mean age 60 ± 8 yr), extreme hypochlorhydria (61 ± 9 yr), and normochlorhydria (58 ± 8 yr). The serum gastrin

level and parietal cell antibodies were determined in the 41 achlorhydric (peak acid output <1 mEq/hr, pH >5) patients. In these patients the diffuse gastritis was localized in the corpus-fundic area, while the changes in the antral region were few and occurred mostly in the superficial zone. In the 42 normochlorhydric patients, however, the diffuse gastritis was localized in the antral region, with only few changes at the corpus-fundic area. In the 13 patients with extreme hypochlorhydria (1-4 mEq/hr), either the fundic or the antral region was involved. In all but two of the achlorhydric patients, the gastrin level was increased (238 to 1,550 ± 14.5 pg/ml) compared to controls (92 pg/ml). The mean level was higher in patients with intact antral mucosa than in those with superficial or diffuse inflammations. Besides the diffuse gastritis, intestinal metaplasia, pseudopyloric metaplasia, and atrophy of mucosa were also observed, although much less commonly. The increase of gastrin level could not be related to a definite morphological pattern in the gastric mucosa. It can be assumed that each of the two types of gastritis has a different natural history; the antral site of gastritis cannot be transformed into the fundic site, nor can the fundic site be transformed into the antral site.

4632 CARCINOIDS OF THE STOMACH. REPORT OF TWO CASES. (Eng.) Seifert, E.; Elster, K. (Staedt Krankenhaus, Koblenzer Str. 115, 5400 Koblenz, W. Germany). *Am. J. Gastroenterol.* 68(4): 372-378; 1977.

Endoscopic, histologic, and clinical findings of two patients with disseminated carcinoids restricted to the stomach were studied to determine proper diagnostic procedures for evaluating this type of lesion. A 52-yr-old woman had a pea-sized gastric polyp, multiple small polypoid carcinoids of the Yamada III type, 12 hyperplasiogenic gastric polyps, and an 8-cm broad-based polyp of the Yamada III type. Initially, histological findings suggested gastric carcinoma due to the presence of gland-like structures, found among splintered fragments of the muscularis mucosa, simulating infiltrating growth. Endoscopic polypectomy to remove the large polyp and 2 small lesions, and electrocoagulation using the hot-biopsy technique to remove 10 small lesions were performed. Laboratory studies were within normal limits for all tested parameters. No recurrence was found at 1.5 yr of follow-up. A 54-yr-old man had a flat, 1.2-cm diameter lesion with a broad base and necrotic surface in the upper part of the gastric fundus and a 1.0-cm diameter lesion in the upper body of the greater curvature that appeared similar to the papilla of Vater (elevated with a central depression, no ulceration). However, bridging folds in the surrounding area partially covered the lesion. A polypectomy snare partially removed the fundic lesion, while endoscopic polypectomy totally removed the other. The histologic diagnosis was carcinoid with multicentric foci; further surgery was planned, but the patient died from a cerebrovascular accident. Diagnosis of disseminated carcinoids of the stomach is complicated because the macroscopic appearance of disseminated gastric carcinoids varies, the histological diagnosis is often difficult because the lesions are located in deeper tissue layers, the histological findings can be misinterpreted, and the exact diagnosis requires removing the entire lesion. Polypectomy, button hole-biopsy, or hot-biopsy are useful methods for assessing the pathology as well as the necessity for surgery.

4633 OBSERVATIONS ON BENIGN GASTRIC ULCER SIMULATING GASTRIC CARCINOMA. (Eng.) Yamagata, S.; Oshiba, S.; Hisamichi, S.; Gomi, T.; Masamune, O.; Mochizuki, F.; *et al.* (Tohoku Univ. Sch. Medicine, Seiryo-cho, 1-1, Sendai, Japan). *Gastroenterol. Jpn.* 12(5):352-356; 1977.

The misdiagnosis of 61 cases that were preoperatively diagnosed as gastric cancer, yet later confirmed in postoperative histological examination as benign gastric ulcer, was analyzed to determine the cause of the errors. Of the 61 cases, 33 were cases of excavated lesions, upon which the investigation focused, and 28 were cases of protruded lesions. Sixteen of 33 were diagnosed pre-operatively as type IIc early cancer; 5 of which were actually gastritis, 10 were benign gastric ulcer or its scar, and 1 was gastric erosion. Ten of 33 cases were diagnosed as type IIc + III or III + IIc early cancer but proved to be benign in postoperative examination. Seven cases diagnosed as Bormann II or III type advanced cancer were actually benign. In 9/33 cases, misdiagnosis was due to the fact that only direct x-ray examination was used; in 15/33 cases both x-ray and endoscopic examinations were used. Even when cytology was added to the procedures, there were still nine cases of misdiagnosis. However, when biopsy was added to the diagnostic procedures, there were only two cases of misdiagnosis. The results indicate that a more accurate diagnosis could be achieved by the use of biopsy.

4634 LIPID-CHEMICAL FEATURES OF HUMAN GASTRIC CANCEROUS, POLYPOUS AND ULCERATIVE TISSUES. (Eng.) Nakazawa, I.; Asaki, S.; Ito, S. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Tohoku J. Exp. Med.* 123(4):365-370; 1977.

The lipid chemical composition of tissue from 14 patients with gastric cancer, 9 with gastric polyps, and 4 with gastric cancer were analyzed by thin-layer and gas-liquid chromatography to identify the biochemical differences between malignant, benign, and precancerous tissue growth. Normal tissue surrounding the lesions was also studied. The total lipid content was decreased in 71% of gastric cancer and in 75% of gastric ulcer and polyp cases compared to the respective control tissue. The lipid fatty acid content was decreased in five of seven gastric cancer cases and three of four with gastric polyps or ulcer. The phospholipid fatty acid content was decreased in five of six gastric cancer patients and three of six with gastric polyps. All five gastric cancer patients demonstrated decreased triglyceride fatty acid content, while three of five gastric polyp cases had an increased content. There were no significant differences in lipid fatty acid composition between

gastric cancerous and benign tissues; however, the average value of $C_{18:2}$ was lower for gastric polyps than for ulcer ($p<0.01$). The average value of phospholipid fatty acid $C_{20:4}$ was increased ($p<0.01$) and $C_{18:2}$ was decreased ($p<0.01$) in gastric patients compared to gastric polyp cases. Triglyceride fatty acid $C_{18:2}$ was significantly decreased ($p<0.01$) in gastric cancer tissues when compared to gastric polyp cases. It is suggested that the changes observed in the cell membrane phospholipid fatty acid composition may produce changes in its fluidity, thus constituting a mechanism for the malignant growth of cancerous tissues.

4635 GASTRIC POLYPS. TRIAL OF CLASSIFICATION OF 83 POLYPS. (Fre.) Lesbros, F.; Labadie, M.; Truchot, R.; Berger, F. (Hopital Edouard Herriot, Place d'Arsonval, 69003 Lyon, France). *Arch. Anat. Cytol. Pathol.* 25(4):251-257; 1977.

Anatomopathological classification of 83 gastric polyps removed from 71 patients by endoscopic resection or gastrectomy is presented. Adenomatous polyps were found in 35 cases, hyperplastic polyps in 35, polyps of antral (Brunner's) glands in 13, and fibroinflammatory polyps in 6. The average of the patients was 62 yr, ranging from 20 to 86 yr. The patients included slightly more women than man, but the difference was not significant. The size of the polyps was 0.3-3 cm, averaging 1 cm. Sixteen patients had two to four polyps, three had more than four. Fifty-six polyps were localized in the antrum, the others in the fundus. Malignant transformation was observed in 5/21 patients with adenomatous polyps. Gastric carcinoma was associated with adenomatous polyps in 12 patients, and with hyperplastic polyps in 3 of 35 patients. Three patients developed recurrent hyperplastic polyps after a latent period of 16-72 months; the first polyp was hyperplastic in one patient, antral gland polyp in another, and unknown in the third. Antral gland polyps and fibroinflammatory polyps are dystrophic or dysgenetic lesions and are not precancerous, while hyperplastic and adenomatous polyps are of a neoplastic nature. Thus, the susceptibility of evolution toward carcinoma occurs in the order hyperplastic polyp, adenomatous polyp, and adenocarcinoma.

4636 PSYCHOLOGICAL DETERMINANTS OF INFANTILE PYLORIC STENOSIS. (Eng.) Revill, S. I.; Dodge, J. A. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XN, Wales). *Arch. Dis. Child.* 53(1): 66-68; 1978.

To investigate the possible contribution of maternal emotional stress to the etiology of infantile pyloric stenosis, 100 mothers of affected infants, 100 "normal" controls who had not sought medical advice at any time concerning feeding problems, and 50 control mothers of children with spina bifida were interviewed. All completed the Life Events Inventory, which gives a quantitative measurement of stressful life events during a given period. In addition, the subject mothers and "normal" controls completed form A of the Eysenck Personality Inventory, the Multiple Affect Adjective Check list, and Linear Analogue Scales for the subjective measurement of satisfaction with feeding and distress caused by feeding problems. A highly significant difference was found between the number of items given a heavy weighting on the Life Events Inventory experienced by the subjects and both control groups ($p<0.02$ with spina bifida controls; $p<0.0001$ with "normal" controls). It is concluded that hypertrophic pyloric stenosis occurs unduly frequently in infants of normal mothers who have been subjected to particularly stressful events during pregnancy.

4637 THE MARKEDLY "CASCADE" STOMACH [Abstract]. (Eng.) Deitel, M. (St. Joseph's Hosp., Toronto, Canada). *Gastroenterology* 72(5, Part 2): 1156; 1977.

4638 GLANDULAR CYSTS OF GASTRIC MUCOSA, A NEW GASTROENTEROLOGICAL ENTITY [Abstract]. (Eng.) Gohrband, G.; Krentz, K. (Luisenhosp., Aachen, W. Germany). *Endoscopy* 9(2):115; 1977.

4639 ACUTE GASTRIC DILATATION IN ANOREXIA NERVOSA. (Eng.) Brook, G. K. (Airedale General Hosp., Steeton, Keighley, W. Yorkshire, England). *Br. Med. J.* 2(6085):499-500; 1977.

4640 UNUSUAL CAUSES OF GASTROCOLIC FISTULA. (Eng.) Laufer, I.; Joffe, N.; Stolberg, H. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastrointest. Radiol.* 2(1):21-25; 1977.

4641 CORROSIVE GASTRITIS. (Eng.) Ragheb, M. I.; Ramadan, A. A.; Khalil, M. A. (Univ. Alexandria Faculty Medicine, Alexandria, Egypt). *Am. J. Surg.* 134(3):343-345; 1977.

4642 DRUG INDUCED ACUTE EROSIVE GASTRITIS: ITS PREVENTION BY ANTACID, METIAMIDE AND CIMETIDINE. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Am. J. Proctol.* 28(2): 23-28; 1977.

4643 IDIOPATHIC CHRONIC GASTRITIS. (Eng.) Chatterjee, D. (Univ. Hosp. West Indies, Mona, Kingston, Jamaica). *Surg. Gynecol. Obstet.* 143(6):986-1000; 1976.

4644 VALUE AND LIMITS OF ENDOSCOPIC GASTRIC MUCOSAL BIOPSIES IN THE DIAGNOSIS OF CHRONIC ATROPHIC GASTRITIS [Abstract]. (Eng.) Naccarato, R.; Farini, R.; Salvagnini, M.; Di Mario, F.; Sturniolo, G. C.; Chiaramonte, M.; Mazzucato, B. (Policlinico Universitario, Padova, Italy). *Rend. Gastroenterol.* 9(1):75; 1977.

4645 POSTOPERATIVE MEDICAL PROBLEMS OF THE STOMACH. (Ger.) Miederer, S. E. (Medizinische Poliklinik der Universitat, Wilhelmstrasse 35, 53 Bonn, W. Germany). *Roentgenblaetter* 30(7): 347-351; 1977.

4646 INCIDENCE AND DIAGNOSIS OF GASTRIC CANCER IN OUT-PATIENT CONDITIONS. (Rus.) Zhivetsky, A. V.; Andrusenko, V. A.; Bodnar, G. V.; Balan, I. V. (Chernovitsy Medical Inst., Chernovitsy, USSR). *Vestn. Khir.* (5):10-13; 1977.

4647 DYNAMICS OF CHANGE OF THE FUNCTIONAL STATE OF THE LIVER BEFORE AND AFTER GASTRECTOMY PERFORMED BY VARIOUS METHODS IN PATIENTS WITH GASTRIC CANCER. (Rus.) Gubergrits, A. Ya.; Sycheva, V. V.; Makarov, V. L. (A. M. Gorky Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (5): 13-18; 1977.

4648 STATISTICAL MORBIDITY OF MALIGNANT GASTRIC TUMORS IN ESTONIA DURING 1963-1972. (Rus.) Rakhu, M. A. (Inst. Experimental and Clinical Medicine, Estonian SSR Ministry Health, Tallin, USSR). *Vopr. Onkol.* 23(5):41-45; 1977.

4649 BLOOD SEROTONIN IN PATIENTS WITH GASTRIC CANCER. (Rus.) Agaev, B. A.; Guliev, B. G. (Azerbaijan State Medical Inst., Baku, USSR). *Vopr. Onkol.* 23(5):50-54; 1977.

4650 EFFECTS OF A COFFEE-ANTACID-MIXTURE AND A COMMERCIAL COFFEE WITH REGARD TO GASTRIN, pH, AND GASTRIC SECRETION. (Ger.) Schusdziarra, V.; Matthiessen, A.; Heisig, N. (Universitatskrankenhauses Hamburg-Eppendorf, W. Germany). *Z. Gastroenterol.* 15(7):448-456; 1977.

4651 FAILURE OF SUTURES FOLLOWING GASTRIC RESECTION FOR GASTRODUODENAL ULCERS. (Rus.) Ladnyuk, B. P.; Goltsov, A. P.; Zabrosaev, V. S.; Sokolov, A. S. (Smolensk Medical Inst., Smolensk, USSR). *Khirurgiia (Mosk.)* (8):9-12; 1977.

4652 POSTGASTRECTOMY ACUTE AFFERENT LOOP SYNDROME: REPORT OF FOUR CASES. (Fre.) Pouyet, M.; Treboux, M.; Perrin, J. P.; Lescoeur, N. (Clinique Claude-Bernard, 69600 Oullins, France). *Lyon Chir.* 73(2):141-145; 1977.

4653 A CASE OF GASTRIC ULCER IN UNTREATED ADDISON'S DISEASE. (Pol.) Olszewski, S.; Kinalska, I. (Acad. Medicine, M. C. Sklodowskiej 24a, 15-276 Bialystok, Poland). *Pol. Tyg. Lek.* 32 (4):155-156; 1977.

4654 ENDOSCOPIC TREATMENT OF PHYTOBEZOARS. (Fre.) Oselladore, D.; Norberto, L.; De Marchi, M. (Inst. Surgical Pathology, Univ. Padua, Padua, Italy). *J. Chir. (Paris)* 113(5/6): 527-530; 1977.

4655 TERATOMAS IN CHILDHOOD: EXPERIENCES IN 50 CASES DURING A 25-YEAR PERIOD: PRESENTATION OF A TERATOMA OF THE STOMACH. (Ger.) Zimmermann, F. A.; Stemp, A. F.; Meister, P. (Univ.-Kinderklinik Munchen, Lindwurmstrasse 4, 8000 Munchen 2, W. Germany). *Z. Kinderchir.* 21 (3):203-213; 1977.

4656 EARLY ENTERAL FEEDING AFTER GASTRIC AND DUODENAL SURGERY. (Rus.) Nechai, A. I.; Abolimov, E. V. (C. M. Kirov Military-Medical Acad., Leningrad, USSR). *Vestn. Khir.* (6):51-55; 1977.

4657 ASSESSMENT OF THE THYROTROPIC FUNCTION OF THE HYPOPHYSIS AND HORMONAL ACTIVITY OF THE THYROID IN PATIENTS WITH GASTRIC CANCER. (Rus.) Afrikyan, M. N.; Menshikov, V. V. (Center Oncology Science, Acad. Medical Sciences USSR, Moscow, USSR). *Sov. Med.* (6):48-51; 1977.

4658 PROBLEMS OF SURGICAL TREATMENT OF GASTRIC POLYPS. (Rus.) Berezov, Yu. E.; Anakhasyan, V. R.; Druker, I. P.; Erokhin, P. G.; Kovalev, A. I.; Kukushkin, V. N.; *et al.* (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):36-40; 1977.

4659 GASTROENTERAL ANASTOMOSIS AND CARCINOMA OF THE GASTRIC STUMP. (Ger.) Dahm, K.; Eichen, R.; Werner, B.; Kozuschek, W. (Chirurgische Universitatsklinik, Martinistrasse 52, D-2000 Hamburg, W. Germany). *Chirurg* 47(9):494-495; 1976.

4660 THE COURSE OF BLEEDING ANASTOMOTIC ULCER: REPORT OF 28 CASES. (Fre.) Bodin, F.; Dyan, S.; Fraitag, B.; Delage, Y.; Lichtenstein, H. (Hopital Saint-Antoine, 184, rue du Faubourg-Saint-Antoine, F 75012 Paris, France). *Gastroenterol. Clin. Biol.* 1(6/7):515-518; 1977.

4661 GASTRIC HEMANGIOPERICYTOMA. (Ger.) Berner, H.; Streicher, H. J. (Chirurgische Klinik, Ferdinand-Sauerbruch-Klinikum, D-5600 Wuppertal 1, W. Germany). *Chirurg* 48(6):400-402; 1977.

4662 MURAMIDASE ACTIVITY IN GASTRIC JUICE AND SERUM IN PATIENTS WITH GASTRIC CARCINOMA. (Pol.) Hanczyc, H.; Luboczynska-Kowalska, W.; Cader, J. (Acad. Medicine, ul. Poniatowskiego 2, 50-326 Wroclaw, Poland). *Pol. Tyg. Lek.* 32(32): 1241-1243; 1977.

4663 SURGICAL APPROACH IN PREPYLORIC STENOSIS DUE TO CORROSIVE SUBSTANCES: INTRAVASCULAR SEGMENTAL ANTRECTOMY IN Y-V. REPORT OF 80 CASES. (Fre.) Popovici, Z. (15, rue Judetului, Bloc 17, Scara II, Ap. 41, Bucharest, Rumania). *J. Chir. (Paris)* 113(2):181-190; 1977.

4664 RESULTS OF TRUNCAL VAGOTOMY FOR THE TREATMENT OF GASTRODUODENAL ULCER: REPORT OF 113 CASES. (Fre.) Grandjean, J. P.; Tissot, E.; MacMoune, F.; Minaire, Y.; Baudet, B.; Moulay, A.; *et al.* (Hopital Edouard Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(3): 192-199; 1977.

See also, 4358, 4360, 4365, 4372, 4373, 4374, 4376, 4379, 4385, 4390, 4396, 4397, 4398, 4400, 4431, 4530, 4541, 4553, 4554, 4556, 4582, 4583, 4593, 4597, 4616, 4619, 4620, 4622, 4650, 4665, 4666, 4676, 4677, 4687, 4695, 4697, 4701, 4702, 4703, 4947, 4950, 4978, 4984, 4985, 5000, 5006, 5012, 5017, 5043, 5045.

STOMACH

Peptic Ulcers

4665 ACID, PEPSIN AND SODIUM OUTPUTS DURING THE INTRAVENOUS PENTAGASTRIN TEST: VARIATIONS ACCORDING TO AGE AND WEIGHT IN MAN. ANALYSIS OF 400 TESTS. (Fre.) Ligny, G.; Verelst, R. (Hopital civil de Charleroi, Boulevard Jason, B-6000 Carleroi, Belgium). *Acta Gastroenterol. Belg.* 40(5/6):205-221; 1977.

Variations in gastric acid and pepsin secretion and in Na output, according to age and weight, were analyzed during the i.v. pentagastrin perfusion test (6 µg/kg/hr) in 177 healthy controls, 107 duodenal ulcer patients, and 116 gastritis patients. Gastric secretion was collected at 15-min intervals. The Na output did not vary significantly between the three groups, nor did it change with age or weight. In duodenal ulcer patients, the acid and pepsin outputs were significantly increased over controls ($p<0.01$) only in patients in the 25- to 35-yr age bracket. The patients with gastritis had significantly decreased acid and pepsin outputs and an increased ratio of pepsin output/acid output ($p<0.01$). An acid output <25.7 mEq/hr was diagnostic of hypoacidity. The acid output did not rise significantly with weight in the patients, nor did it decrease significantly with age in the controls. The overlap of values of acid and pepsin outputs between controls and duodenal ulcer patients, even when adjusted for age and weight, prevents these parameters from being of any use in the diagnostic value of the pentagastrin test.

4666 IMMUNOHISTOCHEMICAL INVESTIGATION OF GASTRIN-PRODUCING CELLS (G CELLS): ESTIMATION OF ANTRAL DENSITY, MUCOSAL DISTRIBUTION, AND TOTAL MASS OF G CELLS IN RESECTED STOMACHS FROM PATIENTS WITH PEPTIC ULCER DISEASE. (Eng.) Stave, R.; Brandtzaeg, P. (Univ. Hosp., Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 13(2):199-203; 1978.

In an effort to correlate several characteristics of the gastrin-producing (G) cells with clinical variables, the mucosal distribution of G cells was quantitatively mapped in resected stomachs from 42 patients (12 with gastric ulcer, 11 with duodenal ulcer, 14 with duodenal ulcer and uremia, and 5 with gastric cancer). Immunoreactive G cells were not seen in the body of the stomach of any of the patients, and only low numbers occurred in the transitional zone along the proximal border of the pyloric antrum. The proximal end of the duodenum contained considerably fewer G cells than did the antrum, and the numbers were equal in all patient groups. Within the antrum, there was, in the material as a whole, a gradual increase in G cell density from the proximal to the distal part, but this difference was not seen in the gastric ulcer patients. The differences between the distal and proximal antrum and between the middle and proximal antrum were significant ($p\leq0.05$). In the patients with duodenal ulcer and uremia there was also a significant difference ($p\leq0.05$) between the middle and distal segments. When the various patient categories were compared, there was no significant difference in the overall antral G cell density, the antral surface area corresponding to the G cell distribution, and the total antral G cell mass. However, the G cell density in the distal antrum was significantly lower ($p\leq0.05$) in patients with gastric ulcer than in the other groups. The variations in these parameters were not significantly related to diagnosis, age, or sex, and a significant positive correlation between body weight and G cell mass was found only in the group with duodenal ulcer and uremia ($r=0.539$, $p\leq0.05$). This variability should be kept in mind when biopsy is used to study the endocrine function of the stomach.

4667 THE INCIDENCE OF UROLITHIASIS IN PEPTIC ULCER PATIENTS. (Eng.) Golematis, B.; Melissas, J.; Hatzitheofilou, C.; Dreiling, D. A.;

Kambysi-Dea, S. (40 Solonos St., Athens 153, Greece). *Am. J. Gastroenterol.* 68(4):367-371; 1977.

The incidence of urinary lithiasis was determined in 200 patients with peptic ulcer and in 200 healthy controls. In 7% of ulcer patients, urinary calculi were found, whereas only 1% ($p<0.01$) was found in the controls. The increased incidence of peptic ulcer was attributed to the consumption of calcium in combination with easily absorbable alkalis (sodium bicarbonate). These findings must be considered in therapy for peptic ulcer diathesis.

4668 CIMETIDINE VERSUS INTENSIVE ANTACID THERAPY FOR DUODENAL ULCER: A MULTICENTER TRIAL. (Eng.) Ippoliti, A. F.; Sturdevant, R. A. L.; Isenberg, J. I.; Binder, M.; Camacho, R.; Cooney, C.; *et al.* (Wadsworth Veterans Hosp., Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *Gastroenterology* 74(2):393-395; 1978.

Ulcer healing and pain relief was studied in 94 patients with duodenal ulcer who were treated with cimetidine or an intensive antacid regimen to compare the two treatments. In a randomized double blind multicenter trial, patients treated with cimetidine (800 or 1,200 mg daily) or an intensive regimen of Al-Mg antacid (210 ml/day) had similar rates of duodenal ulcer healing and pain relief. After 4 weeks of treatment, the proportion of patients with ulcer healing by endoscopy were: 1,200 mg cimetidine, 21 of 33; 800 mg cimetidine, 19 of 32; and antacids, 15 of 29. These proportions did not differ significantly. Eighty percent of cimetidine-treated patients became asymptomatic by week 4, as did 63% of antacid-treated patients ($p>0.1$). No untoward effects were observed during cimetidine treatment. Twenty-seven percent of antacid-treated patients reported diarrhea. There were no significant differences between the two treatments.

4669 CIMETIDINE IN THE TREATMENT OF DUODENAL ULCER: A MULTICENTER DOUBLE BLIND STUDY. (Eng.) Binder, H. J.; Cocco, A.; Crossley, R. J.; Finkelstein, W.; Font, R.; Friedman, G.; *et al.* (Yale Univ., New Haven, CT). *Gastroenterology* 74(2, Part 2):380-388; 1978.

The effect of cimetidine in duodenal ulcer disease was assessed in a double-blind, controlled, prospective, multicenter clinical trial in both inpatients and outpatients. Endoscopic evidence of ulcer healing and symptom evaluation were monitored in 308 patients who received either 1.2 g of cimetidine daily or placebo for periods varying from 2 to 6 weeks. Both groups of patients received antacids only for symptom relief. At the end of 2 weeks of inpatient therapy, 56% of the cimetidine-treated patients and 37% of the patients treated with placebo ($p<0.05$) showed evidence of ulcer healing. Similarly, 46% and 26% of the outpatients treated with cimetidine or placebo, resp., for 2 weeks had ulcer healing ($p<0.05$). At all other time intervals, ulcer healing occurred more frequently in the cimetidine patients than in the controls, but these differences did not achieve statistical significance. Evaluation of symptom relief (day pain, night pain, and severity of pain), "global efficacy," and antacid consumption rates supported the efficacy of cimetidine compared with placebo. Those patients treated with cimetidine who had lower rates of gastric acid secretion (peak acid output <36.3 mEq/hr) after 1 week of therapy had an increased incidence of ulcer healing (53%), in comparison with that in patients with a higher peak acid output (14%, $p<0.05$). In both the cimetidine- and placebo-treated groups, there was little correlation between ulcer healing and symptom improvement. The results demonstrate an acceleration of duodenal ulcer healing and an increased symptom response with cimetidine therapy.

4670 CIMETIDINE TREATMENT OF DUODENAL ULCERATION: SHORT TERM CLINICAL TRIAL AND MAINTENANCE STUDY. (Eng.) Hetzel, D. J.; Hansky, J.; Shearman, D. J. C.; Korman, M. G.; Hecker, R.; Taggart, G. J.; *et al.* (Royal Adelaide Hosp., Adelaide, South Australia 5001, Australia). *Gastroenterology* 74(2, Part 2):389-392; 1978.

Eighty-five patients with endoscopically confirmed duodenal or pyloric canal ulcers entered a double-blind trial with cimetidine (1,200 mg/day, p.o.) or placebo for 6 weeks. Ulcer healing occurred in 84% of patients treated with cimetidine and 38% of those receiving placebo ($p<0.001$). Measurement of basal acid output and maximal acid output before and after treatment showed no significant change, but patients whose ulcers did not heal had a higher basal acid output and maximal acid output than those whose ulcers healed ($p<0.001$ and $p=0.07$, resp.). Patients who smoked or drank alcohol had the same healing rate as abstainers. Sixty-seven patients with duodenal ulceration healed by a 6-week course of cimetidine were randomly allocated to 400 mg of cimetidine twice daily or placebo in the maintenance trial. By the 80th day of therapy, approximately 45% of those receiving placebo had relapsed, whereas none of those receiving cimetidine had relapsed ($p<0.001$). Actuarial analysis of the number of relapses in each group demonstrates that cimetidine is highly effective in preventing relapse.

4671 EFFECT OF ONE-MONTH TREATMENT WITH CIMETIDINE ON GASTRIC SECRETION AND SERUM GASTRIN AND PEPSINOGEN LEVELS. (Eng.) Sewing, K. F.; Hagie, L.; Ippoliti, A. F.; Isenberg, J. I.; Samloff, I. M.; Sturdevant, R. A. L. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 74(2, Part 2):376-379; 1978.

The inhibitory effects of cimetidine on gastric acid and pepsin secretion were studied before and after 1 month of treatment with cimetidine (300 mg, q.i.d.) in 15 male duodenal ulcer patients. Peptone meal- and pentagastrin-stimulated acid secretion and meal-stimulated gastrin release were measured before and 30 min after a single p.o. dose of cimetidine (300 mg). Cimetidine inhibited both

pentagastrin- and peptone meal-stimulated acid secretion significantly better before, than after, 1 month of treatment ($p<0.05$). Similarly, cimetidine inhibited pentagastrin-stimulated pepsin secretion significantly better before treatment ($p<0.01$). Meal-stimulated serum gastrin concentrations were significantly higher after treatment. The mechanisms(s) of these effects is not apparent.

4672 MAINTENANCE TREATMENT OF RECURRENT PEPTIC ULCER BY CIMETIDINE. (Eng.) Bodemar, G.; Walan, A. (Univ. Hosp., 581 85 Linkoping, Sweden). *Lancet* 1(8061):403-407; 1978.

In a double-blind trial of 68 patients with chronic peptic ulcer, 32 received cimetidine (400 mg b.i.d.) and 36 received a placebo for 1 yr. Six of those on cimetidine had an endoscopically proven recurrent ulcer within a mean period of 7 months, while 30 of those on placebo had one after a mean period of 4 months ($p<0.0005$). One patient on cimetidine, compared with 12 patients on placebo, had two recurrences ($p<0.0005$). No patient in the cimetidine group had complications compared to four patients in the placebo group, two of whom had melena and hematemesis and two melena alone ($p<0.05$). Fifteen patients on placebo and one on cimetidine were referred for surgery during the trial because of symptoms from their recurrent ulcers. Day and night ulcer pain and antacid consumption were significantly less ($p<0.001$) and general well-being was better in the cimetidine group. The only probable side-effect of cimetidine was reversible drug-induced liver damage of hypersensitivity type in one patient.

4673 EFFECT OF CIMETIDINE ON PENTAGASTRIN-STIMULATED GASTRIC ACID AND PEPSIN SECRETION BEFORE AND AFTER 6 WEEKS OF CIMETIDINE TREATMENT. (Eng.) Aadland, E.; Berstad, A. (Aker Hosp., Oslo 5, Norway). *Scand. J. Gastroenterol.* 13(2):193-197; 1978.

The effect of i.v. cimetidine on pentagastrin-stimulated gastric acid and pepsin secretion was studied before and after 6 weeks of p.o. cimetidine treatment (1 g/day) in 10 duodenal ulcer patients, to determine whether the effect of this drug changes during the treatment period. The second secretion test was performed 60 hr after the last dose of p.o. cimetidine. Pentagastrin (1.5 μg/kg/hr) was infused for 165 min, and cimetidine (1.2 mg/kg/hr) was added by concomitant infusion during the last 90 min. Mean acid and pepsin secretion in response to pentagastrin stimulation were not significantly changed after 6 weeks of p.o. cimetidine treatment, with gastric acid and pepsin values being 35.1 ± 23.8 mmol/hr and 164.8 ± 67.3 mg/hr, resp., before treatment and 34.8 ± 20.1 mmol/hr and 234.5 ± 185.1 mg/hr, resp., after treatment. However, the response to pentagastrin plus cimetidine administration was significantly higher at the end of the treatment period (gastric acid and pepsin values were 5.7 ± 3.8 mmol/hr and 29.8 ± 17.5 mg/hr, resp., before treatment and 9.9 ± 5.7 mmol/hr and 90.0 ± 77.6 mg/hr, resp., after treatment, $p<0.05$ and $p<0.02$, resp.). Moreover, before the treatment period with cimetidine, pepsin output during pentagastrin plus cimetidine was, on average, 20.5% of the response to pentagastrin alone, while after treatment this value increased to 38.9% ($p<0.05$). The results suggest a slightly reduced effect of cimetidine after its prolonged use. However, cimetidine was still effective after having cured the ulcers in 6 weeks of treatment; in one patient there was no further significant reduction of the effect of cimetidine infusion between 6 and 10 weeks of cimetidine treatment.

4674 ESTIMATION OF THE ANTRAL AND DUODENAL GASTRIN CELL POPULATION REMOVED BY GASTRECTOMY FROM PATIENTS WITH PEPTIC ULCER. (Eng.) Keuppens, F.; Willems, G.; Vansteenkiste, Y.; Wousen-Colle, M. C. (Gastrointestinal Res. Unit, Vrije Universiteit Brussels, Brussels, Belgium). *Surg. Gynecol. Obstet.* 146(3):400-406; 1978.

The total number of gastric and duodenal gastrin cells was determined in the gastrectomy specimens from eight patients with peptic ulcer, using a modified method. Planimetry was used to determine the antral and duodenal surface. The immunoperoxidase method with specific antigastrin antibodies was used for staining gastrin cells, and the mean concentration of nucleated gastrin cells/mm^2 of antral and duodenal surface was determined by light microscopy. The mean number of duodenal gastrin cells in the resected duodenum was 4.8% of the total gastric gastrin cell mass. The concentration of gastrin cells was greatest in the antrum and quite variable from one mucosal site to another. The degree of extension of the antral gastritic areas was a major factor influencing the mean concentration value. The total number of gastrin cells in the stomach varied from approximately 7 to 74 million cells. These data indicate that hyperplasia of gastrin cells cannot be demonstrated by studies performed in small specimens taken for biopsy.

4675 JEJUNAL INHIBITION OF GASTRIC ACID SECRETION INDUCED BY HYPERTONIC GLUCOSE IN DUODENAL ULCER PATIENTS BEFORE AND AFTER TRUNCAL VAGOTOMY. (Eng.) Christiansen, J.; Aagaard, P.; Hansen, T. (Glostrup Hosp., DK-2600 Glostrup, Copenhagen, Denmark). *Ann. Surg.* 187(2):122-125; 1978.

The possible vagal control of the inhibition of gastric acid secretion induced by intrajejunally administered hypertonic glucose was studied in eight duodenal ulcer patients. Hypertonic glucose was infused after the induction of acid secretion by pentagastrin (0.5 μg/kg/hr) in the patients before and 3 to 5 months after truncal vagotomy. Preoperatively, mean acid output was reduced from 44.0 ± 3.1 mEq H^+/hr to 29.2 ± 2.9 mEq H^+/hr ($p<0.05$), whereas no consistent changes were found postoperatively, suggesting that jejunal inhibition of gastric acid secretion induced by hypertonic glucose primarily is under vagal control. Furthermore,

the study shows that glucose-induced jejunal inhibition of acid secretion seems to be less pronounced in duodenal ulcer patients than was previously found in healthy subjects.

4676 EFFECT OF SELECTIVE GASTRIC VAGOTOMY ON HISTAMINE CONCENTRATION IN GASTRIC MUCOSA OF PATIENTS WITH DUODENAL ULCER. (Eng.) Troidl, H.; Rohde, H.; Lorenz, W.; Hafner, G.; Hamelmann, H. (Univ. Surgical Clinic, Robert-Koch-Strasse 8, 3550 Marburg/Lahn, W. Germany). *Br. J. Surg.* 65(1):10-16; 1978.

In a prospective controlled trial, histamine concentrations were determined fluorometrically in the gastric mucosa of 23 patients 6-11 months after selective gastric vagotomy with drainage and in patients who had undergone other types of operation for duodenal ulcer. The study was in two parts: part 1, a synchronous investigation of mucosal histamine concentrations in patients who had undergone vagotomy, in duodenal ulcer patients before operation, and in control subjects; part 2, a consecutive study of the same patients before and after vagotomy. In part 1, patients with Hollander-negative vagotomy were found to have significantly ($p<0.01$) higher mucosal histamine concentrations than did healthy control subjects or duodenal ulcer patients before operation. Patients with recurrent ulcer, however, had mucosal histamine concentrations as low as those of duodenal ulcer patients who had not been operated on. In part 2, all duodenal ulcer patients showed an increase in gastric mucosal histamine concentration after vagotomy ($p<0.01$). The smallest increase was in a patient with an incomplete vagotomy. Control patients who were not operated on but who underwent endoscopy and biopsy twice in the period of investigation, did not show any increase in mucosal histamine concentration between the times of the first and the second biopsy. The overall results of selective vagotomy and drainage, with respect both to clinical Visick gradings and to radiological and acid secretory findings, were comparable to those reported by other authors. No significant change in numbers of parietal cells was found after vagotomy. Thus, selective gastric vagotomy with a drainage procedure leads to increased concentrations of histamine in the mucosa of the body of the stomach in man. The mechanism is not clear, but might be through inhibition of histamine release from mast cell stores.

4677 SHOULD CHOLECYSTECTOMY BE COMBINED WITH VAGOTOMY AND PYLOROPLASTY? (Eng.) Taylor, T. V.; Qureshi, S.; Lambert, M. E.; Torrance, B. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *Lancet* 1(8059):295-298; 1978.

Sixty patients who had undergone vagotomy, pyloroplasty, and cholecystectomy were compared with age- and sex-matched controls who had undergone vagotomy and pyloroplasty alone or cholecystectomy alone. In the early postoperative period after the combined procedure, there was a very high incidence of postvagotomy diarrhea (48.3%, $p=0.00013$) and bile reflux gastritis. The findings implicate bile acids--their excretion and handling by the small intestine--in the etiology of postvagotomy diarrhea. Where the conditions coexist, truncal vagotomy and pyloroplasty should be avoided in the treatment of the duodenal ulcer because of the risk of postvagotomy diarrhea and bile reflux gastritis.

4678 ADENYLATE CYCLASE ACTIVITY IN GASTRIC MUCOSAL BIOPSY SPECIMENS OF NORMALS [sic] AND DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Sewing, K. F.; Ruoff, H. J.; Malchow, H. (Dept. Pharmacology, Univ. Tubingen, 7400 Tubingen, W. Germany). *Gastroenterology* 72(5, Part 2):1130; 1977.

4679 LUMINAL GASTRIN AND GASTRIN RELEASE [Letter to Editor]. (Eng.) Quinn, T. J.; Fiddian-Green, R. G. (Univ. Hosp., Ann Arbor, MI 48104). *Lancet* 2(8032):307-308; 1977.

4680 STIMULATION OF GASTRIN RELEASE AND GASTRIC ACID SECRETION BY A STANDARDIZED PEPTONE TEST MEAL IN NORMAL SUBJECTS AND DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Fritsch, W. P.; Gehrsmann, U.; Hausamen, T. U. (I Medizinische Universitatsklinik A., Dusseldorf, W. Germany). *Rend. Gastroenterol.* 9(1):69-70; 1977.

4681 THE GENETICS OF PEPTIC ULCER DISEASE--ELEVATED SERUM GROUP I PEPSINOGEN CONCENTRATIONS IN SIBLINGS AND TWINS OF ULCER PROBANDS [Abstract]. (Eng.) Rotter, J. I.; Rimoin, D. L.; Samloff, I. M.; McConnell, R. B.; Jensen, K. G.; Gadeberg, O.; Hauge, M. (Harbor General Hosp., Torrance, CA). *Gastroenterology* 72(5, Part 2):1165; 1977.

4682 GASTRIC EMPTYING AND PLASMA SECRETIN LEVELS AFTER ORAL ADMINISTRATION OF HYDROCHLORIC ACID IN NORMAL AND DUODENAL ULCER SUBJECTS [Abstract]. (Eng.) McLoughlin, J. C.; Green, R.; Buchanan, K. D. (Dept. Medicine, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(5):A406; 1977.

4683 PLASMA SECRETIN IN FASTING AND POSTPRANDIAL STATE IN MAN [Abstract]. (Eng.) Chey, W. Y.; Hendricks, J.; Tai, H. H. (Genesee Hosp., Rochester, NY). *Gastroenterology* 72(5, Part 2):1156; 1977.

4684 PEPTIC ULCER, PYLOROPLASTY, AND DIETARY FAT. A NEW CONCEPT. (Eng.) Childs, P. (Plymouth General Hosp., Plymouth, England). *Ann. R. Coll. Surg. Engl.* 59(2):143-147; 1977.

4685 PREVENTION OF RELAPSE OF DUODENAL ULCER BY BEDTIME CIMETIDINE: A DOUBLE-BLIND CLINICAL TRIAL [Abstract]. (Eng.) Blackwood, W. S.; Maudgal, D. P.; Northfield, T. C. (St. George's

Hosp. Medical Sch., London, England). *Gut* 18(5): A420; 1977.

4686 CIMETIDINE OR INTENSIVE ANTACID THERAPY FOR DUODENAL ULCER--A CONTROLLED MULTICENTER TRIAL [Abstract]. (Eng.) Ippoliti, A. F. (Center Ulcer Res. and Education [CURE], Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1161; 1977.

4687 CIMETIDINE AND ACTIVE DUODENAL AND PREPYLORIC ULCERS. (Eng.) Bodemar, G.; Walan, A. (Univ. Hosp., Linkoping, Sweden). *Scand. J. Gastroenterol.* 11(Suppl. 42):155-158; 1976.

4688 MAINTENANCE CIMETIDINE IN THE CONTROL OF DUODENAL ULCER SYMPTOMS [Abstract]. (Eng.) Gray, G. R.; Smith, I. S.; Gillespie, G.; Mackenzie, I. (Victoria Infirmary, Glasgow, Scotland). *Gut* 18 (5):A420; 1977.

4689 EFFECT OF CIMETIDINE ON PENTAGASTRIN- AND MEAL-STIMULATED GASTRIC ACID SECRETION AND SERUM GASTRIN BEFORE AND AFTER ONE MONTH OF DAILY CIMETIDINE TREATMENT [Abstract]. (Eng.) Sewing, K. F.; Hagie, L.; Ippoliti, A. F.; Isenberg, J. I.; Samloff, I. M.; Sturdevant, R. A. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1129; 1977.

4690 EFFECT OF ONE YEAR'S TREATMENT WITH CIMETIDINE ON PARIETAL CELL MASS IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Spence, R. W.; Celestin, L. R.; McCormick, D. A. (Frenchay Hosp., Bristol, England). *Gut* 18(5):A420-A421; 1977.

4691 AGRANULOCYTOSIS FOUR MONTHS AFTER CIMETIDINE THERAPY [Letter to Editor]. (Eng.) Craven, E. R.; Whittington, J. M. (Kettering and District General Hosp., Kettering, Northamtonshire NN16 8UZ, England). *Lancet* 2(8032):294-295; 1977.

4692 A DOUBLE-BLIND TRIAL OF THE SYMPTOMATIC EFFECT OF PRINDAMINE IN DUODENAL ULCER PATIENTS. (Eng.) Wulff, H. R.; Soltoft, J.; Gudmand-Hoyer, E.; Mollmann, K. M.; Bonnevie, O.; Hopfner Petersen, H. E.; Overo, K. F. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 42):129-131; 1976.

4693 5,6,7,8-TETRAHYDROQUINOLINES. 4. ANTIULCER AND ANTISECRETORY ACTIVITY OF 5,6,7,8-TETRAHYDROQUINOLINENITRILES AND -THIOAMIDES. (Eng.) Beattie, D. E.; Crossley, R.; Curran, A. C. W.; Dixon, G. T.; Hill, D. G.; Lawrence, A. E.; Shepherd, R. G. (Inst. Medical Res., Wyeth Lab., Huntercombe Lane South, Taplow, Maidenhead, Berkshire SL6 OPH, England). *J. Med. Chem.* 20(5):714-718; 1977.

4694 5,6,7,8-TETRAHYDROQUINOLINES. 5. ANTIULCER AND ANTISECRETORY ACTIVITY OF 5,6,7,8-TETRAHYDROQUINOLINETHIOUREAS AND RELATED HETEROCYCLES. (Eng.) Beattie, D. E.; Crossley, R.; Curran, A. C. W.; Hill, D. G.; Lawrence, A. E. (Inst. Medical Res., Wyeth Lab., Huntercombe Lane South, Taplow, Maidenhead, Berkshire SL6 OPH, England). *J. Med. Chem.* 20(5):718-721; 1977.

4695 RELATIONSHIPS OF GASTRIN TO DUODENAL ULCER DISEASE IN MAN AND THE EFFECTS OF SURGERY. (Eng.) Herbst, C. A., Jr. (Univ. North Carolina Sch. Medicine, 136 Clinical Sciences Bldg., 229H, Chapel Hill, NC 27514). *Am. J. Surg.* 133(5): 619-627; 1977.

4696 EFFECT OF PROXIMAL GASTRIC VAGOTOMY ON GASTRIC SECRETION. (Eng.) Roland, M. (Aker Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):89-91; 1976.

4697 INFLUENCE OF DIFFERENT TECHNIQUES OF PROXIMAL GASTRIC VAGOTOMY UPON RISK OF RECURRENT DUODENAL ULCER AND GASTRIC ACID SECRETION. (Eng.) Kronborg, O.; Jorgensen, P. M.; Holst-Christensen, J. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 143(1):53-56; 1977.

See also, 4378, 4379, 4382, 4393, 4538, 4583, 4597, 4619, 4650, 4651, 4659, 4664, 4702, 5000.

SMALL INTESTINE

4698 ANGIOGRAPHIC DIAGNOSIS OF SMALL INTESTINAL CARCINOIDS. (Ger.) Schmidt, K. R.; Pfeifer, K. J.; Spelsberg, F. (Rontgenabt. der Chirurgischen Klinik, Universitat Munchen, Nussbaumstrasse 20, D-8000 Munich, W. Germany). *Strahlentherapie* 153(10):668-673; 1977.

The angiographic diagnosis of metastasizing small intestinal carcinoid in two women aged 61 and 65 yr, resp., is described. Conventional x-ray examinations (gastrointestinal passage and colon irrigoscopy) failed to furnish a correct diagnosis. The carcinoid of the ileum was diagnosed by arteriography

of the superior mesenteric artery and hepatic artery. In one case, the vascular changes in the lower ileum, combined with numerous hypervascularized metastases in the liver, allowed diagnosis of the primary tumor and identification of its type. In the second case, the correct diagnosis was established solely on the basis of the specific vascular alterations, which indicated the infiltrating carcinoid (vascular star, missing parenchymatous change, belated venous drainage in the tumor region). The findings indicate that to improve prognosis arteriography should be used for early diagnosis whenever a metastasizing small intestinal carcinoid is suspected.

4699 ARTERIOMESENTERIC OBSTRUCTION OF THE DUODENUM. (Ger.) Wendt, F.; Hofmann, H.; Wiedemann, F. H.; Zimmermann, H. B.; Vogel, S. (II. Medizinische Klinik des Bereichs Medizin [Charite], Humboldt-Universitat, Schumannstrasse 20, DDR-104 Berlin, E. Germany). *Zentralbl. Chir.* 102(18): 1102-1109; 1977.

Chronic arteriomesenteric duodenal stenosis was diagnosed in four women during a 5-yr period. Postprandial nausea and emesis were the common symptoms; two patients also complained about postprandial epigastric pains. Pathological changes were revealed in all cases by infusion cholangiography. Blood and urine chemistry were normal. Retrocolic side-to-side jejunostomy with Braun's anastomosis was performed in all cases. A firm and tense mesenteric vascular band compressing the transverse part of the duodenum was found in all cases. The oral parts of the duodenum were distended and inflated. The surgery was successful in all four cases.

4700 IN VITRO SENSITIZATION AND MAST CELL DEGRANULATION IN HUMAN JEJUNAL MUCOSA. (Eng.) Selbekk, B. H.; Aas, K.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(1):87-92; 1978.

The degree of mast cell degranulation was studied in sensitized jejunal mucosa. Sera from three allergic patients with specific IgE antibodies as shown by radioallergosorbent test were used to sensitize jejunal mucosa obtained from surgical patients. The sensitized specimens were challenged with the appropriate antigens to the specific IgE shown in the sera. Nonchallenged sensitized specimens were used as controls to determine mast cell degranulation. The mast cells were counted in a defined area in the mucosa immediately adjacent to the muscularis mucosa. Mast cell degranulation was 4% in a timothy pollen system, 40% in an egg-white system, and 33% in a codfish system. The results indicate that mast cells in the human jejunal mucosa react in the same manner as mast cells in other organs when they are sensitized by IgE antibodies and are challenged with the appropriate antigen. The results further support reports that allergic reactions of the immediate hypersensitivity type may result in a number of gastrointestinal diseases. The experimental model described appears suitable for studying the allergic reaction in the gastrointestinal tract and the effect of pharmacotherapy in this respect.

4701 EPITHELIAL CELL TURNOVER AND MUCUS PRODUCTION IN MAN. (Eng.) Croft, D. N.; Domschke, W.; Domschke, S.; Hagel, J.; Demling, L. (St. Thomas' Hosp., London, SE1 7EH, England). *Adv. Exp. Med. Biol.* 89:39-50; 1977.

4702 INTESTINAL PNEUMATOSIS: A REPORT OF TWO CASES. (Eng.) Gandhi, A. G.; Joshi, M. J. (No affiliation given). *Am. J. Proctol.* 28(3):45-50; 1977.

4703 NONROTATION OF THE SMALL BOWEL AND INVERSION OF THE STOMACH: CASE REPORT. (Eng.) Rodriguez, M. A. (Univ. North Dakota Sch. Medicine, Grand Forks, ND 58202). *Milit. Med.* 142(10):795-797; 1977.

4704 DUODENAL ATRESIA WITH BILIARY ANOMALIES AND UNUSUAL GAS PATTERN. (Eng.) Raine, P. A. M.; Noblett, H. R. (Royal Children's Hosp., Flemington Rd., Parkville, Victoria 3052, Australia). *J. Pediatr. Surg.* 12(5):763-765; 1977.

4705 DUODENAL OBSTRUCTION IN A NEWBORN SECONDARY TO A MULTICYSTIC KIDNEY. (Eng.) Porterfield, G. N.; Campbell, D. P. (Univ. Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190). *J. Pediatr. Surg.* 12(5): 767-769; 1977.

4706 DELAYED APPEARANCE OF A LEFT POSTEROLATERAL DIAPHRAGMATIC HERNIA RESULTING IN SIGNIFICANT SMALL BOWEL NECROSIS. (Eng.) Woolley, M. M. (Children's Hosp. Los Angeles, 4650 Sunset Blvd., Los Angeles, CA 90054). *J. Pediatr. Surg.* 12(5):673-674; 1977.

4707 ISOLATED PERFORATIONS OF THE ILEUM AND JEJUNUM IN BLUNT ABDOMINAL TRAUMA. (Eng.) Musa, M. B.; Meah, F. (General Hosp., Kuala Lumpur, Malaysia). *Aust. N.Z. J. Surg.* 47(4):526-528; 1977.

4708 TUBERCULOSIS AFTER JEJUNOILEAL BYPASS FOR OBESITY. (Eng.) Bruce, R. M.; Wise, L. (Pulmonary Div., Washington Univ., 660 S. Euclid Ave., St. Louis, MO 63110). *Ann. Intern. Med.* 87(5):574-576; 1977.

4709 AN ULTRASTRUCTURAL STUDY OF THE BRUNNER'S CYST. (Eng.) Taura, M.; Taura, S.; Kummerow, F. A.; Noritomi, S.; Iwanaga, S. (Burnsides Res. Lab., Univ. Illinois at Urbana-Champaign, Urbana, IL 61801). *Gastroenterol. Jpn.* 12(3): 241-244; 1977.

4710 BODY COMPOSITION AND ADIPOSE TISSUE CELLULARITY BEFORE AND AFTER JEJUNO-ILEOSTOMY IN SEVERELY OBESE SUBJECTS. (Eng.) Kral, J. G.; Bjorntorp, P.; Schersten, T.; Sjostrom, L. (Sahlgren's Hosp., S-413 45 Gothenburg, Sweden). *Eur. J. Clin. Invest.* 7(5):413-419; 1977.

4711 ETIOLOGY OF CONGENITAL INTRINSIC DUODENAL OBSTRUCTION: WITH SPECIAL REFERENCE TO THE T-SHAPED BILE DUCT ANOMALY. (Eng.) Yura, J.; Takahashi, H.; Shibata, K. (Nagoya City Univ. Medical Sch., Mizuho-ku, Nagoya, 467, Japan). *Arch. Jpn. Chir.* 46(5):615-620; 1977.

4712 A CRITICAL ANALYSIS OF 51 PATIENTS WITH JEJUNOILEAL BYPASS. (Eng.) Mersheimer, W. L.; Kazarian, K. K.; Dursi, J. F. (New York Medical Coll., New York, NY). *Surg. Gynecol. Obstet.* 745(6):847-852; 1977.

4713 SPONTANEOUS NECROTIZING FASCIITIS: OCCURRENCE SECONDARY TO OCCULT DIVERTICULITIS. (Eng.) Galbut, D. L.; Gerber, D. L.; Belgraier, A. H. (Columbia Univ., Coll. Physicians and Surgeons, 630 W. 168th St., New York, NY 10032). *JAMA* 238(21):2302; 1977.

4714 BLEEDING INTESTINAL VARICES ASSOCIATED WITH PORTAL HYPERTENSION AND PREVIOUS ABDOMINAL SURGERY. (Eng.) Fee, H. J.; Taylor, J. B.; O'Connell, T. X. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Am. Surg.* 43(11):760-762; 1977.

4715 THE PEUTZ-JEGHERS SYNDROME: A 39-YEAR CLINICAL AND RADIOGRAPHIC FOLLOW-UP REPORT [Letter to Editor]. (Eng.) Long, J. A., Jr.; Dreyfuss, J. R. (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. J. Med.* 297(19):1070; 1977.

4716 INTRACELLULAR FAT TRANSPORT AND ITS DISTURBANCE [Abstract]. (Eng.) Sano, M.; Sasagawa, T. (City Hosp., Niigata, Japan). *Gastroenterol. Jpn.* 12(4):322-323; 1977.

4717 BOWEL PERFORATION WITH CANDIDIASIS. (Eng.) Schlossberg, D.; Devig, P. M.; Travers, H.; Kovalcik, P. J.; Mullen, J. T. (Polyclinic Medical Center, Harrisburg, PA 17105). *JAMA* 238(23):2520-2521; 1977.

4718 EXTERNAL DUODENAL FISTULA. (Eng.) Anderson, G. W.; Goss, J. C.; Lawrence, G. H. (Good Samaritan Hosp., Portland, OR). *Am. Surg.* 43(10):666-669; 1977.

4719 RESULTS OF JEJUNOILEAL BYPASS IN TWO HUNDRED PATIENTS WITH MORBID OBESITY. (Eng.) Scott, H. W., Jr.; Dean, R. H.; Shull, H. J.; Gluck, F. (Vanderbilt Univ. Medical Center, Nashville, TN). *Surg. Gynecol. Obstet.* 145(5): 661-673; 1977.

4720 ACUTE REVERSIBLE RENAL FAILURE FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY: A CLINICAL AND PATHOLOGICAL (EM) STUDY OF A CASE. (Eng.) Ehlers, S. M.; Posalaky, Z.; Strate, R. G.; Quattlebaum, F. W. (St. Paul-Ramsey Hosp. and Medical Center, St. Paul, MN 55101). *Surgery* 82(5):629-634; 1977.

4721 ISCHAEMIC ILEAL NECROSIS AND CARCINOID TUMOUR. (Eng.) Chapuis, P.; Weedon, D. (Royal Brisbane Hosp., Herston, Brisbane, Queensland 4029, Australia). *Aust. N.Z. J. Surg.* 46(1): 63-64; 1976.

See also, 4295, 4400, 4492, 4498, 4505, 4531, 4534, 4539, 4550, 4554, 4586, 4656, 4664, 4746, 4748, 4758, 4769, 4776, 4985, 5002, 5005, 5009, 5012, 5013, 5016, 5017, 5019, 5024, 5025, 5027, 5029, 5034, 5035, 5037, 5041, 5043, 5050, 5051, 5056.

SMALL INTESTINE

Malabsorption

4722 COELIAC DISEASE IN SUDANESE CHILDREN. (Eng.) Suliman, G. I. (P.O. Box 412, Khartoum, Sudan). *Gut* 19(2):121-125; 1978.

Seven Sudanese children with celiac disease, of whom two are siblings, are described. They all had evidence of impaired intestinal absorption and severe histological changes of their jejunal mucosa with clinical and histological improvement on gluten-free/sorgham-free diets. Subsequently, one patient had a clinical relapse when gluten was reintroduced; four had positive gluten challenge using serial

1-hr blood xylose estimations. All patients belonged to the upper socioeconomic group of the society in the north of Sudan.

4723 REPORT OF A CASE OF HEREDITARY FRUCTOSE INTOLERANCE. (Ita.) Colombini, G.; Morandi, P.; Martello, M. T. (Ente Ospedaliero, Melzo-Gorgonzola, Italy). *Terapia* 62(443):34-37; 1977.

4724 SEVERE KERATITIS DUE TO HYPOVITAMINOSIS A IN A PATIENT WITH GLUTEN ENTEROPATHY. (Ita.) Martinucci, M.; Adami-Lami Conti, C.; Calandi, C. (Istituto di Clinica Pediatrica dell' Universita di Firenze, Florence, Italy). *Minerva Pediatr.* 29(13):931-934; 1977.

See also, 4490, 4585, 4715, 4716, 5013, 5050, 5056.

LARGE INTESTINE

4725 THE RADIOLOGICAL SIGNS OF ACUTE APPENDICITIS IN INFANCY AND CHILDHOOD. (Eng.) Isdale, J. M. (Transvaal Memorial Hosp. for Children, Johannesburg, South Africa). *S. Afr. Med. J.* 53 (10):363-364; 1978.

To assess the diagnostic value of radiology in appendicitis, the radiological findings in 93 children operated on for acute appendicitis were reviewed retrospectively. Acute appendicitis was confirmed in 76. These children were compared with 40 children with abdominal pain, but without appendicitis. Preoperative radiographs in the children with appendicitis showed a significantly higher incidence of scoliosis, properitoneal line displacement, cecal dilatation with air/fluid levels, and terminal ileal dilatation with air/fluid levels ($p<0.001$) than in the controls. The incidence of radiologically demonstrable fecaliths was not significantly higher in the children with acute appendicitis. In children under the age of 4 yr, in whom the diagnosis of acute appendicitis is often difficult, the radiological signs are helpful.

4726 INHIBITION OF ROSETTE FORMATION BY ANTITHYMOCYTE GLOBULIN: AN INDICATOR FOR T-CELL COMPETENCE IN COLORECTAL CANCER PATIENTS. (Eng.) Ichiki, A. T.; Collmann, I. R.; Sonoda, T.; MacGuire, J. A.; Wenzel, K. L.; Krauss, S. (Univ. Tennessee Memorial Res. Center, 1924 Alcoa Highway, Knoxville, TN 37920). *Cancer Immunol. Immunother.* 3(2):119-124; 1977.

The peripheral WBC from 29 patients with adenocarcinoma of the colon were studied sequentially for the thymus-derived cell (T-cell) level, the rosette-inhibition titer of antithymocyte globulin, and the blastogenic response to phytohemagglutinin (PHA) and concanavalin A (Con A) to evaluate the T-cell immunocompetence. The level of E-rosette-forming cells and the blastogenic response did not reflect the immunocompetence of the T-cell population. Fluctuations in the rosette-inhibition titer of antithymocyte globulin (ATG) were observed. An increased ATG titer indicated an unfavorable clinical course, while a decreased ATG titer was observed with patients who had a favorable clinical course. The rosette-inhibition titer with antithymocyte globulin was an important indicator of competent T cells in patients with colorectal cancer.

4727 SYSTEMIC ADJUVANT IMMUNOTHERAPY AND CHEMOIMMUNOTHERAPY IN PATIENTS WITH COLORECTAL CANCER (DUKES' C CLASS): PROLONGATION OF DISEASE FREE INTERVAL AND SURVIVAL. (Eng.) Mavligit, G. M.; Gutterman, J. U.; Malahy, M. A.; Burgess, M. A.; McBride, C. M.; Jubert, A.; *et al.* *In: Adjuvant Therapy of Cancer.* Edited by S. E. Salmon and S. E. Jones. (Amsterdam: Elsevier/North-Holland Biomedical Press): 279-286; 1977.

In an effort to improve the treatment of colorectal cancer patients, 121 patients who underwent surgery between 1973-1976 for carcinoma of the large bowel, Dukes' C classification (involvement of regional lymph nodes without invasion of adjacent structure or distant organs), were entered into a clinical trial of adjuvant therapy. Fifty-two patients received *bacillus Calmette-Guerin* (BCG) by scarification, and 69 received the combination of 5-fluorouracil (5-FU) p.o. and BCG as described in a previous paper. Treatment evaluation in terms of disease-free interval and overall survival was compared with the same clinical parameters in a consecutive series of comparable historical surgical control patients operated on between 1963-1973. No difference was observed between BCG alone and the combination of 5-FU and BCG in terms of either the disease-free interval or the survival rate. Both treatments, however, significantly prolonged survival ($p<0.002$) when compared with the controls. There was a marked shift in the prognosis of adjuvant-treated C patients toward that of surgically-treated Dukes' B patients in whom a 60% 5-yr survival can be anticipated com-

pared to 35% for surgically-treated Dukes' C patients. There were 26 relapses among 84 patients with primary carcinoma of the rectosigmoid, 18 occurring locally, but only 8 relapses among 37 patients with primary carcinoma arising proximal to the rectosigmoid, 2 occurring locally ($p=0.07$). This relapse pattern among patients receiving adjuvant therapy demonstrates a need for augmented protection against local recurrence, perhaps by administration of postoperative radiotherapy. Adjuvant therapy, especially with BCG, is advocated for patients with colorectal carcinoma, Dukes' C class, following potentially curative surgery.

4728 COLONIC AND RECTAL VILLOUS TUMORS. COMPARATIVE ANALYSIS OF SURGERY AND RADIOTHERAPY. REPORT OF 104 CASES. (Fre.) Raymond, A.; Horiot, J. C.; Guillaud, M.; Papillon, J.; Guillemin, G. (Hotel-Dieu, 74, boulevard des Belges, 69006 Lyon Cedex, France). *J. Chir. (Paris)* 114(3): 153-165; 1977.

The efficacy of surgery and radiotherapy was studied in two series of patients with colorectal villous tumors. Forty-six patients (series I) underwent surgery; local excision was performed in 24 cases, radical resection (colectomy, anterior resection, pull through, Hartmann operation) in 17, and amputation in 5. The postoperative mortality was 3/46. Thirty-nine patients were under observation for 1-17 yr (average, 3 yr). The recurrence rate was 12/39; 9 of the recurrent tumors were benign and the others were malignant. Most of the recurrences developed after local excision. The recurrences were treated successfully by contact radiotherapy or local or radical resection. Thirty-two of the 39 patients have been tumor-free for an average of 3 yr. Another 57 patients (series II) received contact radiotherapy (surface dose 2,000-4,000 rads/session, 4-6 sessions at 8- to 15-day intervals, total dose 8,000-20,000 rads) or interstitial radiotherapy with radium or iridium. Twenty-one of these patients received radiotherapy for recurrent tumors after surgery (group 1), 13 received prophylactic irradiation after surgery (group 2), and 23 underwent primary curative radiotherapy (group 3). The cure rates were 13/21, 10/13, and 18/23 in groups 1, 2, and 3, resp. The findings indicate that therapy should first be surgical, but that adjuvant radiotherapy may be beneficial when the tumor is malignant and noninvasive or in the event of recurrence. Curative radiotherapy is on the exceptional occasion possible in the case of tumors less than 3 cm in diameter and situated at less than 12 cm from the anus.

4729 ANTIBIOTIC-ASSOCIATED PSEUDOMEMBRANOUS COLITIS DUE TO TOXIN-PRODUCING CLOSTRIDIA. (Eng.) Bartlett, J. G.; Chang, T. W.; Gurwith, M.; Gorbach, S. L.; Onderdonk, A. B. (Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *N. Engl. J. Med.* 298(10):531-534; 1978.

To examine the etiologic relationship between pseudomembranous colitis and antimicrobic therapy, the stools of 4 patients with clindamicin- or cephalothin-induced pseudomembranous colitis, 54 patients with antibiotic-associated diarrhea, 10 patients without diarrhea who had received antibiotics, and 14 untreated controls without gastrointestinal symptoms were examined for cytotoxicity in tissue culture and for the ability to produce *Clostridia* overgrowth in the hamster colon. A substance producing cytotoxicity in tissue culture was detected in stool specimens from all 4 patients with pseudomembranous colitis due to antibiotics and in 1 of the 54 with antibiotic-associated diarrhea. These stools also caused enterocolitis when injected intracecally into hamsters. On each occasion, cytotoxicity in tissue culture and enterocolitis in hamsters were neutralized by pretreatment with gas gangrene antitoxin. The toxicity in both tissue cultures and hamsters could be reproduced with broth cultures of *Clostridia* strains isolated from four of the five stools. These results suggest that toxin-producing *Clostridia* are responsible for antibiotic-associated pseudomembranous colitis.

4730 OPERATIVE ENDOSCOPY OF POLYPOID COLONIC CHANGES. (Ger.) Brandstatter, G.; Kratochvil, P. (II. Medizinische Abteilung, Landeskrankenhaus, Auenbruggerplatz 1, A-8036 Graz, Austria). *Acta Chir. Austriaca* 9(1):14-17; 1977.

Endoscopic polypectomy by means of a diathermy loop was performed in 37 patients presenting with 41 colonic polyps. All polyps were pedunculated or narrow-based (endoscopic resection of sessile polyps was considered contraindicated). Forty polyps were identified morphologically; they included 34 polypoid adenomas (including 1 with focal carcinoma), 3 papillary adenomas, 1 villous adenoma, 1 hyperplastic polyp, and 1 inflammatory pseudopolyp. The complications included arterial hemorrhage in one case. The polypectomy ulcers healed in about 2 weeks. Endoscopic polypectomy alone is sufficient in the case of pedunculated polyps with focal carcinoma due to the absence of metastases, and in the case of adenocarcinoma with degree I and II of malignancy. Resection is always indicated, however, in the case of adenocarcinoma with degree III of malignancy and in anaplastic carcinoma.

4731 EPITHELIAL CELL KINETICS IN THE CRYPTS OF FAMILIAL POLYPOSIS OF COLON. (Eng.) Iwama, T.; Utzunomiya, J.; Sasaki, J. (Tokyo Medical and Dental Univ., Tokyo, Japan). *Jpn. J. Surg.* 7(4):230-234; 1977.

Epithelial cell kinetics were examined in the uninvolved part of the rectal mucosa in nine patients with familial polyposis of colon, six first degree relatives, and six controls. Biopsy specimens were incubated for 2 hr in culture medium containing ^{3}H-thymidine. In all but one of the controls, the proliferating zone was confined to the lower two-thirds of the crypt. Six of the nine patients with familial polyposis had crypts with an altered proliferating zone; ^{3}H-thymidine incorporation was observed in the upper third of the crypt. Three of six first-degree relatives showed these changes.

These results suggest the possibility of the detection of the latent patients with familial polyposis colon by autoradiography of the rectal mucosa.

4732 THE COLONOSCOPE IN CECAL VOLVULUS: REPORT OF THREE CASES. (Eng.) Anderson, M. J.; Okike, N.; Spencer, R. J. (Mayo Clinic, West 4[A], Rochester, MN 55901). *Dis. Colon Rectum* 21(1):71-74; 1978.

Colonoscopy was employed to attempt detorsion of volvulus of the right colon in three patients considered to be high-risk surgical patients. In one patient, detorsion was accomplished, making emergency laparotomy unnecessary. The site of torsion was reached in every patient. The authors feel that when detorsion does not occur within half an hour after the colonoscope enters the right colon, persistent efforts are more likely to be harmful than helpful. Early diagnosis and earlier employment of colonoscopy should result in an increased rate of success in accomplishing detorsion. When detorsion is accomplished, subsequent resection of the right colon should be seriously considered to prevent recurrence.

4733 ACUTE DIVERTICULITIS IN THE YOUNG ADULT. (Eng.) Homer, M. J.; Danford, R. O. (Tufts-New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Radiology* 125(3):623-626; 1977.

4734 ACUTE APPENDICITIS WITH ABSCESS SIMULATING CARCINOMA OF THE SIGMOID. (Eng.) Halls, J. M.; Meyers, H. I. (Los Angeles County-Univ. Southern California Medical Center, 1200 North State St., Los Angeles, CA 90033). *Am. J. Roentgenol.* 129(6):1057-1059; 1977.

4735 BENIGN NONEPITHELIAL TUMORS OF THE LARGE INTESTINE. (Eng.) Berardi, R. S. (Veterans Admin. Hosp., 30th and Euclid, Des Moines, IA 50310). *Am. J. Proctol.* 28(6):36-42; 1977.

4736 COMPLETE PROLAPSE (PROCIDENTIA) OF THE RECTUM: A CONTRIBUTION TO THE SURGICAL TREATMENT. (Eng.) Cassimally, K. A. I. (Fort Pierce Memorial Hosp., Fort Pierce, FL). *Am. J. Proctol.* 28(6):52-56; 1977.

4737 ENCOPRESIS: A GOOD RESULT IN A BOY WITH UTP (URIDINE-5-TRIPHOSPHATE). (Eng.) Musicco, N. (No affiliation given). *Am. J. Proctol.* 28(6):43-46; 1977.

4738 PROPIONIC ACIDEMIA AND ANORECTAL ANOMALIES IN THREE SIBLINGS. (Eng.) Branski, D.; Gale, R.; Gross-Kieselstein, E.; Abrahamov, A. (Children's Hosp., 219 Bryant St., Buffalo, NY 14222). *Am. J. Dis. Child.* 131(12):1379-1381; 1977.

4739 PREOPERATIVE BOWEL PREPARATION: ERYTHROMYCIN BASE SERUM AND FECAL LEVELS FOLLOWING ORAL ADMINISTRATION. (Eng.) Nichols, R. L.; Condon, R. E.; DiSanto, A. R. (Tulane Univ. Sch. Medicine, 1430 Tulane Ave., New Orleans, LA 70112). *Arch. Surg.* 112(12):1493-1496; 1977.

4740 FAMILIAL POLYPOSIS IN A FAMILY. (Eng.) Amirkhan, A. D.; Farhad, M.; Daneshgar, H.; Khorasani, K. (Medical Univ. Isfahan, Isfahan, Iran). *Abdom. Surg.* 19(5):105-106; 1977.

4741 RECTAL BIOPSY IN ULTRASHORT SEGMENTS (HIRSCHSPRUNG'S DISEASE). (Eng.) Martinez-Almoyna, C.; Monereo, G. (Clinica Infantil "La Paz," C.S. de la S.S. "La Paz," Avda. Generalisimo, 177, Madrid-20, Spain). *Z. Kinderchir.* 22(2):152-159; 1977.

4742 ADENOCARCINOMA IN TUBULAR DUPLICATION OF THE SIGMOID COLON. (Eng.) Arkema, K. K.; Calenoff, L. (Northwestern Memorial Hosp., 303 East Superior, Chicago, IL 60611). *Gastrointest. Radiol.* 2(2):137-139; 1977.

4743 YERSINIA COLITIS. (Eng.) Lachman, R.; Soong, J.; Wishon, G.; Maenza, R.; Hanelin, L.; St. Geme, J. (Univ. California at Los Angeles-Harbor General Hosp., Box 27, 1000 West Carson St., Torrance, CA 90509). *Gastrointest. Radiol.* 2(2):133-135; 1977.

4744 COMPUTER-AIDED PREDICTION OF GANGRENOUS AND PERFORATING APPENDICITIS. (Eng.) Graham, D. F. (Univ. Dept. Surgery, Edinburgh EH8 9AG, Scotland). *Br. Med. J.* 2(6099):1375-1377; 1977.

4745 PNEUMATOSIS AND CYSTOIDES INTESTINALIS: REPORT OF A CASE WITH COLONOSCOPIC FINDINGS OF INFLAMMATORY BOWEL DISEASE. (Eng.) Forde, K. A.; Whitlock, R. T.; Seaman, W. B. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY). *Am. J. Gastroenterol.* 68(2):188-190; 1977.

4746 INTESTINAL OBSTRUCTION DUE TO A DEFECT IN THE OMENTUM. (Eng.) McCredie, J. A. (Victoria Hosp., 375 South St., London, Ontario N6A 5A5, Canada). *Can. J. Surg.* 20(6):560-562; 1977.

4747 ARTHRITIS ASSOCIATED WITH AMPICILLIN COLITIS. (Eng.) Rothschild, B. M.; Masi, A. T.; June, P. L. (Univ. Tennessee Center Health Sciences, 858 Madison Ave., Memphis, TN 38163). *Arch. Intern. Med.* 137(11):1605-1607; 1977.

4748 ILEOCOLIC INTUSSUSCEPTION--A CASE REPORT. (Eng.) Burke, L. F.; Clark, E. (Portland

Adventist Hosp., Portland, OR 97215). *J. Clin. Ultrasound* 5(5):346-347; 1977.

4749 MESENCHYMAL CHONDROSARCOMA OF THE RECTUS SHEATH: CASE REPORT WITH ULTRASONIC FINDINGS. (Eng.) O'Malley, B. P.; Qizilbash, A. H. (Henderson General Hosp., Concession St., Hamilton, Ontario L8V 1C3, Canada). *J. Clin. Ultrasound* 5(5):348-349; 1977.

4750 INTESTINAL OBSTRUCTION: A COMPLICATION OF PERCUTANEOUS CYSTOTOMY. A CASE REPORT. (Eng.) Moody, T. E.; Howards, S. S.; Schneider, J. A.; Rudolf, L. E. (Univ. Virginia Sch. Medicine, Charlottesville, VA). *J. Urol.* 118(4):680; 1977.

4751 VOLVULUS OF THE CECUM FOLLOWING TRANSPLANT DONOR NEPHRECTOMY. (Eng.) Etheredge, E. E.; Martz, M.; Anderson, C. B. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Surgery* 82(5):764-767; 1977.

4752 RECENT ADVANCES IN COLORECTAL SURGERY. (Eng.) Pheils, M. T. (Repatriation General Hosp., Concord, New South Wales 2139, Australia). *Aust. N.Z. J. Surg.* 47(4):442-445; 1977.

4753 PSEUDOMEMBRANOUS COLITIS: A REVIEW. (Eng.) Smith, C. (Truman Medical Center, Columbia, MO). *Mo. Med.* 74(10):593-596; 1977.

4754 COMPARATIVE EVALUATION OF THE COMMONLY PERFORMED EMERGENCY PROCEDURES FOR THE PREVENTION OF RECURRENCE OF SIGMOID VOLVULUS. (Eng.) Bhatnagar, B. N. S.; Roy, S. K.; Chakravarty, M. R. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi-221005, India). *Am. J. Proctol.* 28(5): 35-44; 1977.

4755 ANORECTAL EXCISIONAL MYOMECTOMY FOR DISTAL SHORT SEGMENT HIRSCHSPRUNG'S DISEASE. (Eng.) Lee, Y. K.; Koh, Y. B. (St. Mary's Hosp., Seoul, South Korea). *Am. J. Proctol.* 28(5):52-58; 1977.

4756 THE ANAL CRYPTS AND GLANDS AND A NEW, GROOVED CRYPT HOOK. (Eng.) Abramson, D. J. (Walter Reed Army Medical Center, Washington, DC 20012). *Am. J. Proctol.* 28(5):59-61; 1977.

4757 COLO-COLIC INTUSSUSCEPTION DUE TO A HEMANGIOMA. (Eng.) Bower, R. J.; Kiesewetter, W. B. (Children's Hosp., 125 Desoto St., Pittsburgh, PA 15213). *J. Pediatr. Surg.* 12(5):777-778; 1977.

4758 SALT-LOADING REDUCED FUNCTIONAL BUT NOT MORPHOLOGICAL ADAPTATION OF THE ILEUM AFTER COLECTOMY. (Eng.) Paschal, G. W.; Low, R.; Tilson, M. D.; Wright, H. K. (Yale Univ. Sch. Medicine, New Haven, CT). *Surg. Forum* 28:438-439; 1977.

4759 THE DIAGNOSTIC VALUE OF SERUM LYSOZYME ACTIVITY IN INFLAMMATORY BOWEL DISEASE. (Eng.) Ayulo, J. A.; Chen, C. C.; Pelot, D.; Berk, J. E. (Coll. Medicine, Univ. California, Irvine, CA). *Am. J. Gastroenterol.* 68(1):71-76; 1977.

4760 TOTAL AND SUBTOTAL COLONOSCOPY WITH SHORT INSTRUMENT AND WITHOUT FLUOROSCOPY. (Eng.) Cronstedt, J.; Deurell, S. I.; Vestergaard, P. (Bollnas Hosp., Bollnas, Sweden). *Acta Med. Scand.* 202(4):265-269; 1977.

4761 TREATMENT OF SESSILE VILLOUS AND TUBULO-VILLOUS ADENOMAS OF THE RECTUM: EXPERIENCE OF ST. MARK'S HOSPITAL, 1963-1972. (Eng.) Thomson, J. P. S. (St. Mark's Hosp., City Rd., London EC1V 2PS, England). *Dis. Colon Rectum* 20(6):467-472; 1977.

4762 DIVERTICULAR DISEASE OF THE APPENDIX. (Eng.) Payan, H. M. (Bell Memorial Hosp., Ishpeming, MI 49849). *Dis. Colon Rectum* 20(6): 473-476; 1977.

4763 DIVERTICULOSIS OF THE COLON IN ISRAEL. (Eng.) Levy, N.; Luboshitzki, R.; Shiratzki, Y.; Ghivarello, M. (Rothschild Univ. Hosp., P.O. Box 4940, Haifa, Israel). *Dis. Colon Rectum* 20(6):477-481; 1977.

4764 THE IRRITABLE BOWEL SYNDROME. (Eng.) Drossman, D. A.; Powell, D. W.; Sessions, J. T., Jr. (Univ. North Carolina, Sch. Medicine, Chapel Hill, NC 27514). *Gastroenterology* 73(4, Part 1):811-822; 1977.

4765 PSEUDO-OBSTRUCTION OF THE COLON (OGILVIE'S SYNDROME), A GENUINE CLINICAL CONDITION? REVIEW OF THE LITERATURE (1948-1975) AND REPORT OF

FIVE CASES. (Eng.) Soreide, O.; Bjerkeset, T.; Fossdal, J. E. (Univ. Hosp. Bergen, 5016 Haukaland Sykehus, Bergen, Norway). *Dis. Colon Rectum* 20(6): 487-491; 1977.

4766 ABDOMINAL MASS AND COLONIC PERFORATION IN A CASE OF THE HEMOLYTIC-UREMIC SYNDROME. (Eng.) Liebhaber, M. I.; Parker, B. R.; Morton, J. A.; Tune, B. M. (Stanford Univ. Hosp., 520 Willow Rd., Palo Alto, CA 94304). *Am. J. Dis. Child.* 131(10):1168-1169; 1977.

See also, 4289, 4499, 4534, 4550, 4554, 4587, 4590, 4592, 4701, 4768, 4770, 4794, 4795, 4822, 4999, 5001, 5002, 5005, 5013, 5016, 5017, 5019, 5024, 5025, 5027, 5029, 5034, 5037, 5038, 5041, 5043, 5045, 5051, 5064.

LARGE INTESTINE

Ulcerative Colitis

4767 THE HUMORAL IMMUNE SYSTEM IN INFLAMMATORY BOWEL DISEASE. II. IMMUNOGLOBULIN LEVELS. (Eng.) Hodgson, H. J. F.; Jewell, D. P. (Royal Free Hosp., London NW3, England). *Am. J. Dig. Dis.* 23 (2):123-128; 1978.

Serum IgG, IgA, and IgM were estimated in 93 patients with ulcerative colitis, 65 patients with Crohn's disease, and 52 hospitalized controls, and the results correlated with the clinical features of the patients. Although a significantly higher mean IgG level in ulcerative colitis compared to Crohn's disease was confirmed ($p<0.005$), no difference was found when the comparison was limited to patients with colonic Crohn's disease. Patients with either disease had higher mean IgM levels than controls ($p<0.001$), and the IgM levels were higher on treatment with corticosteroids ($p<0.05$ for ulcerative colitis, $p<0.02$ for Crohn's disease) and showed a tendency to rise in remission. IgG and IgM levels were also higher in both diseases if extra-intestinal manifestations were present ($p<0.0005$). It is concluded that if clinical features, particularly disease site, are taken into account, the overall immunoglobulin responses in these two diseases show no differences.

4768 THE EPITHELIAL CELL GRANULOMA. DIAGNOSTIC AND HISTOGENIC VALUE IN PROLONGED COLITIS IN CHILDREN. (Fre.) Nezelof, C.; Despres, S. (Hopital des Enfants Malades, 149 rue de Sevres, 75015 Paris, France). *Ann. Anat. Pathol. (Paris)* 22(2):171-176; 1977.

The results of rectal biopsies were compared in 22 children (aged 2-16) suffering from chronic colitis. Of these, 7 had Crohn's disease, 5 had a nonspecific colitis, and 10 had ulcerative colitis. Nodular epithelioid giant cell lesions were found in 5/10, 1/7, and 1/5 of these patients, resp. These epithelial cell granulomas denote a specific and elective destruction of glandular epithelial cells, which starts with the rupturing of the basal membranes and leads to the eventual destruction of the glandular crypt. The use of PAS and Alcian blue for staining the histologic preparations can aid in distinguishing these granulomas from the follicular lesions found in Crohn's disease. Since the onset of the damage always occurs in the basal membrane, an autoimmune mechanism is suspected.

4769 FUNCTIONAL AND HISTOLOGICAL ABNORMALITIES OF THE SMALL INTESTINAL MUCOSA IN ULCERATIVE COLITIS IN REMISSION--PRIMARY MANIFESTATIONS OF UNRECOGNIZED DISEASE [Abstract]? (Eng.) Arvanitakis, C. (Kansas Univ. Sch. Medicine, Kansas City, KS). *Gastroenterology* 72(5, Part 2):1154; 1977.

4770 KUPFFER CELL UPTAKE OF MICRO-AGGREGATED ALBUMIN: (a) IN RELATION TO LIVER BLOOD FLOW; (b) IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Anderson, A. J.; James, O.; Wardle, E. H. (Dept. Medicine, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Gastroenterology* 72(5, Part 2):1024; 1977.

4771 PULMONARY FUNCTION IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Eade, O. E.; Smith, C. L.; Whorwell, P. J. (Southampton Univ. Hosp., Southampton, Hants, England). *Gut* 18(5):A423; 1977.

See also, 4493, 4494, 4514, 4515, 4590, 4743, 4759, 5013, 5066.

4772 RESECTION OF THE PANCREAS: ITS EFFECT ON BONE AND CALCIUM METABOLISM. (Ger.) Dammann, H. G.; Kruse, H. P.; Kuhlencordt, F.; Montz, R.; Schreiber, H. W. (Abteilung Klinische Osteologie, I. Medizinische Klinik, Universitat Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Z. Gastroenterol.* 15(9):577-585; 1977.

Bone and calcium metabolism was studied in five patients 4-10 yr after total pancreatectomy (1 patient), partial pancreatectomy (3), or pancreaticojejunal anastomosis (1). The histomorphometry of the spongiosa of the iliac crest (determination of the volumetric density and inactive surface of the spongiosa, the total osteoid surface, the osteoid surface with and without osteoblasts, the relative osteoblast activity, the total resorption surface areas, resorption lacunae with and without osteoclasts, and the relative osteoclast activity) revealed high-turnover osteoporosis. There were no signs of osteomalacia or secondary hyperparathyroidism. The serum calcium level was 8.8-10.2 mg/100 ml, the serum phosphorus level 3.2-3.8 mg/100 ml, the urinary calcium excretion 40.9-238.7 mg/day, the urinary phosphorus excretion 515-788 mg/day, and the hydroxyproline excretion 7.6-26 mg/day. The mineral content of the radius was reduced to 0.56-0.72 g/cm^2. Radiocalcium investigations following i.v. or p.o. administration of calcium isotope showed increased endogenous fecal calcium loss (366-530 mg/day versus a normal range of 130-270 mg/day) in all patients, while the intestinal absorption and renal excretion of calcium were normal. Further investigations will be necessary to explain the pathophysiological relationship between resection of the pancreas and its influence on calcium and bone metabolism.

4773 THE ROLE OF PERCUTANEOUS LIVER BIOPSY IN THE PRETREATMENT EVALUATION OF PANCREATIC ADENOCARCINOMA. (Eng.) Bender, R. A.; Brennan, M. F. (Natl. Cancer Inst., Bldg. 10, Rm. 12N226, 9000 Rockville Pike, Bethesda, MD 20014). *Am. J. Surg.* 135(2):207-209; 1978.

Experience with 22 patients with locally unresectable adenocarcinoma of the exocrine pancreas who underwent percutaneous liver biopsies within a median of 6 weeks of laparotomy is presented. Three patients had positive biopsies obtained either blindly or at peritoneoscopy. Of these three patients, two had elevations in either alkaline phosphatase, direct bilirubin, or hepatic transaminase levels, and one of these two patients had an abnormal liver-spleen scintigram. Liver biopsies are recommended for all patients being evaluated for pancreatic resection either pre- or intraoperatively.

4774 LYMPH NODE INVOLVEMENT IN CARCINOMA OF THE HEAD OF THE PANCREAS AREA. (Eng.) Cubilla, A. L.; Fortner, J.; Fitzgerald, P. J. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Cancer* 41(3):880-887; 1978.

The lymph node involvement in 33 pancreatectomy specimens (regional pancreatectomy, 18; total pancreatectomy, 7; Whipple partial pancreatectomy, 8) was studied prospectively. There were 22 patients with pancreas duct adenocarcinoma, 6 with ampullary carcinoma, 3 with duodenal adenocarcinoma, 1 with bile duct carcinoma, and 1 with carcinoma of undetermined origin. Peripancreatic lymph nodes were divided into five main groups with subgroups. They were (1) superior (superior head, superior body, and gastric), (2) inferior (inferior head and inferior body), (3) anterior (anterior pancreaticoduodenal, pyloric, and mesenteric), (4) posterior (posterior pancreaticoduodenal and common bile duct), and (5) splenic (lymph nodes at hilum of spleen and at the tail of pancreas). The average number of lymph nodes found in different types of surgical specimens was: regional pancreatectomy, 70; total pancreatectomy, 41; and Whipple procedure, 33. The average number of lymph nodes involved with metastatic tumor in these specimens was 5, 3, and 1, resp. The most common sites of metastasis were in the superior head and in the posterior pancreaticoduodenal groups. Pancreatic duct adenocarcinoma tended to metastasize to multiple lymph nodes of the superior head, superior body, and posterior pancreaticoduodenal lymph nodes (88% of patients). Ampullary adenocarcinoma metastasized less often (33%), usually to fewer nodes and to one adjacent periampullary group. Since in 33% of patients, nodal metastases of duct adenocarcinoma of the head of the pancreas were present in groups not usually removed in the Whipple procedure, it appears that this operation is inadequate for surgical eradication of pancreas duct adenocarcinoma of the head of the pancreas.

4775 WEBER-CHRISTIAN SYNDROME AND PANCREATIC CARCINOMA. REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Fre.) Delamarre, J.; Capron, J. P.; Chivrac, D.; Dupas, J. L.; Gontier, M. F.; Lorriaux, A. (Centre Hospitalier Universitaire, F 80030 Amiens Cedex, France). *Gastroenterol. Clin. Biol.* 1(10):789-798; 1977.

The association of Weber-Christian syndrome (WCS) with cancer of the pancreas was observed in a 63-yr-old man hospitalized for cutaneous nodules. Biopsy revealed fat necrosis. Pancreatic tumor, suspected clinically, biologically, and radiologically, was found at surgery. The inoperable tumor was identified as a pseudo-acinous adenocarcinoma. During the course of the disease, the patient had several cutaneous and articular crises. Death occurred 8 months after the onset of the disease. An analysis of the 25 other cases reported in the literature shows pancreatopathy in only three cases. All cases of WCS associated with pancreatic tumors were fatal, but it is unknown if WCS modifies the prognosis of pancreatic tumors in general. The pathogenesis of WCS associated with cancer of the pancreas is unknown. The subcutaneous fat necrosis in WCS is explained by the activity of pancreatic enzymes.

4776 DISACCHARIDASE ACTIVITIES IN SMALL INTESTINAL MUCOSA IN PATIENTS WITH CYSTIC FIBROSIS. (Eng.) Antonowicz, I.; Lebenthal, E.; Shwachman, H. (Harvard Medical Sch., 300 Longwood Ave., Boston, MA 02115). *J. Pediatr.* 92(2): 214-219; 1978.

The disaccharidase activities in small intestinal biopsies were related to the morphology of the mucosa and the ages of 63 patients with cystic fibrosis and 177 healthy Caucasian controls. In patients with CF and in the healthy controls under 5 yr of age with normal intestinal mucosa, no low lactase activity was found. In the 15 patients with CF who were over 5 yr of age, lactase activity was high in 11 (13.1-57.1 μM/min/g protein, mean 30.1 ± 15.8) and low in 4 (0-3.1 μM/min/g protein); in controls over 5 yr, 35 had high lactase activity (10.8-86.0 μM/min/g, mean 28.3 ± 9.0) and 8 had low activity (2.1-8.7 μM/min/g, mean 5.5 ± 1.5). These findings support the view that, in patients with CF, lactase deficiency is not related to the disease entity. In patients with or without CF who had the same degree of mucosal atrophy, the decrease of disaccharidase activities followed the same pattern, indicating that enzyme activities are affected to the same extent by the damage of the mucosa. In patients with CF with pancreatic insufficiency, the disaccharidase activities were significantly ($p<0.001$) higher when compared to those in control subjects of the same age and ethnic group, although the increase was not uniform in all patients with cystic fibrosis. The relationship between the present results and the decreased activity of pancreatic secretions found in patients with CF remains to be determined.

4777 FURTHER STUDIES INDICATING A TOXIC METABOLIC ACTION OF ALCOHOL ON PANCREATIC CELLS: CORRELATIONS WITH HEPATIC PATHOLOGY AND DIET [Abstract]. (Eng.) Bordalo, O.; Noronha, M.; Dreiling, D. (Faculty Medicine, Univ. Lisbon, Lisbon, Portugal). *Ir. J. Med. Sci.* 146(Suppl. 1): 33-34; 1977.

4778 TRASYLOL, GLUCAGON AND CIMETIDINE IN THE PROPHYLAXIS OF "SATELLITE" PANCREATIC INJURY IN THE COURSE OF OPERATIONS ON THE PAPILLA OF VATER: PRELIMINARY FINDINGS [Abstract]. (Eng.) Dobrilla, G.; Gritti, G.; Filippini, M.; Valentini, M.; Tripepi, C. (Ospedale Regionale, 1-39100 Bolzano, Bolzano, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):35-36; 1977.

4779 CYTOLOGY OF THE DUODENAL ASPIRATE COLLECTED DURING THE SECRETIN-PANCREOZYMIN TEST (VALIDITY AND LIMITS IN THE DIAGNOSIS OF PANCREATIC CARCINOMA). [Abstract]. (Eng.) Farini, R.; Matarazzo, R.; Rebuffi, A.; Costantin, G.; Pellizzari, L.; Del Favero, G.; *et al.* (Istitito Clinica Medica I, Universita Padova, Padova, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):40-41; 1977.

4780 FINDINGS BY ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERCP), ENDOSCOPIC RETROGRADE BRUSH CYTOLOGY (ERBC) AND ENDOSCOPIC ASPIRATION CYTOLOGY (EAC) IN MALIGNANCIES OF THE PANCREAS [Abstract]. (Eng.) Osnes, M.; Serck-Hanssen, A.; Swensen, T.; Aune, S.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Ir. J. Med. Sci.* 146(Suppl. 1):27; 1977.

4781 CLINICAL APPLICATION OF RADIOISOTOPE SCANNING OF THE PANCREAS [Abstract]. (Eng.) Testa, H. J.; Prescott, M.; Braganza, J. M.; Horrance, H. B.; Howat, H. T. (Royal Infirmary, Manchester, England). *Ir. J. Med. Sci.* 146 (Suppl. 1):27; 1977.

4782 PANCREATIC JUICE RESPONSE TO SECRETIN, PANCREATIC JUICE AND SERUM CARCINOEMBRYONIC ANTIGEN (CEA) AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) IN THE STUDY OF PANCREATIC DISEASE [Abstract]. (Eng.) Carr-Locke, D. L. (Dept. Medicine, Univ. Leicester, Leicester, England). *Clin. Sci. Mol. Med.* 53(3):16P; 1977.

See also, 4410, 4551, 4557, 4567, 4568, 4569, 4570, 4571, 4572, 4573, 4574, 4575, 4589, 4598, 4600, 4788, 4791, 4796, 4811, 4822, 4910, 4982, 4994, 5012, 5042.

PANCREAS

Pancreatitis

4783 PANCREATIC UPTAKE OF GALLIUM-67 CITRATE IN ACUTE PANCREATITIS. (Eng.) Tanaka, T.; Mishkin, F. S.; Buozas, D. J.; Barrett, I. R. (Martin Luther King, Jr. General Hosp., Los Angeles, CA). *Appl. Radiol.* 7(1):163-164; 1978.

To assess the sensibility of the finding of increased gallium accumulation in scans from patients with acute pancreatitis, the medical records and gallium scans of all the patients with acute or chronic pancreatitis who received the scans within a 4-yr period were reviewed. All seven patients with clinically certain acute pancreatitis demonstrated increased uptake of the nuclide in the pancreas. No pancreatic uptake appeared in studies of those patients who were diagnosed as alcoholics with chron-

ic pancreatitis or in studies of those who had a past history of pancreatitis but did not have the acute disease when they were admitted. It is concluded that the ^{67}Ga-citrate scan can be used in confirming the diagnosis of acute pancreatitis.

4784 STUDIES ON THE ASCITES FLUID OF ACUTE PANCREATITIS IN MAN. (Eng.) Geokas, M. C.; Rinderknecht, H.; Brodrick, J. W.; Largman, C. (Veterans Admin. Hosp., Martinez, CA 94553). *Am. J. Dig. Dis.* 23(2):182-188; 1978.

The levels of total protein, α_1-antitrypsin, α_2-macroglobulin, amylase, methemalbumin, tryptic amidase activity, radioimmunoassayable elastase 2, and three lysosomal hydrolases were determined in the ascites fluid from 12 patients with acute alcoholic pancreatitis, to predict the course of the disease on the basis of one or more of these parameters. In eight patients, methemalbumin was detected in ascites and serum, supporting the diagnosis of hemorrhagic pancreatitis. Significant levels (4-45 µg/ml) of tryptic amidase activity were detected in ascites samples from all patients. Sephadex G-200 gel filtration of ascites fluid from one patient showed that tryptic amidase activity elutes as a single peak corresponding to the elution position of α_2-macroglobulin, indicating that the tryptic amidase activity is due to α_2-macroglobulin-bound trypsin. Pancreatic elastase 2, determined with a new sensitive and specific radioimmunoassay, ranged from 400 to 2,100 ng/ml in serum and from 650 to 4,460 ng/ml in ascites fluid. Substantial amounts of α_2-macroglobulin-bound trypsin and elastase 2, entering the circulation from the peritoneal cavity, might be responsible for certain serious complications seen in acute pancreatitis. However, with the exception of serum calcium and methemalbumin and the ascites fluid methemalbumin and total protein, none of the biochemical parameters studied showed a distinct correlation with the patient's outcome.

4785 GLUCAGON THERAPY IN ACUTE PANCREATITIS: REPORT OF A DOUBLE-BLIND TRIAL. (Eng.) Durr, H. K.; Maroske, D.; Zelder, O.; Bode, J. C. (Medizinische Klinik der Universitat Marburg, D-3550 Marburg/Lahn, W. Germany). *Gut* 19(3):175-179; 1978.

The value of glucagon therapy was assessed in a double-blind trial of 69 patients with acute pancreatitis. In a subgroup of 59 patients, statistical analysis showed no significant differences between the glucagon-treated (n=29; 2 x 5 mg protamine-zinc glucagon/day, i.m.) and the placebo-treated (n=30) subjects for the following data: duration of pain felt spontaneously and induced by palpation, amounts of analgesics and antispasmodics required by the patients, duration of hospital stay, serum amylase activities, and 24 hr urine collections. Mortality rates did not differ significantly between the glucagon-treated and the placebo-treated subjects in the total group of 69 patients, in the two subgroups of patients who were treated conservatively (n=59), or those who underwent laparotomy because of severe peritonitis (n=10). It is concluded that favorable effects of glucagon upon the course of acute pancreatitis, if they do exist, are not significant.

4786 PANCREATICOJEJUNOSTOMY FOR CHRONIC PANCREATITIS: TWO- TO 21-YEAR FOLLOW-UP. (Eng.) Prinz, R. A.; Kaufman, B. H.; Folk, F. A.; Greenlee, H. B. (Veterans Admin. Hosp., Hines, IL 60141). *Arch. Surg.* 113(4):520-525; 1978.

Experience with 77 patients who underwent a total of 80 pancreaticojejunostomies for intractable pain of chronic pancreatitis between 1954 and 1975 is presented. All patients had a history of chronic alcoholism. Drainage operations done primarily for pseudocysts were excluded. Operative procedures included 7 caudal pancreaticojejunostomies, 42 longitudinal pancreaticojejunostomies with splenectomy and implantation of the pancreas into the jejunum, and 31 side-to-side pancreaticojejunostomies. Eighty-one percent of the patients noted substantial improvement or complete resolution of their abdominal pain on follow-up that ranged from 2 to 21 yr. The operative mortality was 5%. Thirty-two patients died during the period of the follow-up. Continued alcohol abuse, carcinoma, and cardiovascular disease were the leading causes of mortality. The data confirm the effectiveness of pancreaticojejunostomy in relieving the pain of chronic relapsing pancreatitis.

4787 JEJUNAL MONOSACCHARIDE, WATER, AND ELECTROLYTE TRANSPORT IN PATIENTS WITH CHRONIC PANCREATITIS. (Eng.) Helman, C. A.; Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Observatory, 7925, Cape Town, South Africa). *Gut* 19(1):46-49; 1978.

Jejunal perfusion studies were carried out to assess water, electrolyte, d-xylose, and d-glucose transport in 16 patients with chronic calcific pancreatitis (8 with and 8 without steatorrhea) and in 10 controls. The patients with steatorrhea demonstrated significantly less xylose, water, and electrolyte absorption ($p<0.001$) than did patients without steatorrhea and control subjects, when an isosmotic saline-xylose solution was perfused. On the other hand, when an isosmotic saline-glucose solution was perfused, the patients with steatorrhea absorbed significantly more glucose, water, and electrolytes ($p<0.01$) than did control subjects. Significant correlation was demonstrated between the absorption of xylose as measured by the segmental perfusion technique and the peak serum xylose level during perfusion as well as the 5-hr urinary xylose excretion after a 25 g p.o. dose of xylose ($r=0.75$, $p<0.001$). The xylose absorption measured by small bowel perfusion also correlated significantly with pancreatic juice amylase and trypsin concentrations obtained during a standard pancreatic function test ($r=0.84$, $p<0.001$ and $r=0.78$, $p<0.001$, resp.). Patients with pancreatic steatorrhea have a highly significant decrease in xylose absorption by the jejunum as compared with normal controls and subjects with calcific pancreatitis without steatorrhea.

4788 SERUM ISOAMYLASE PATTERN IN OBSTRUCTIVE PANCREATIC DISEASE. (Eng.) Skude, G.; Wehlin, L.; Ohashi, K. (Malmo General Hosp., S-21401 Malmo, Sweden). *Scand. J. Gastroenterol.* 12(6):673-676; 1977.

The possibility that a serum isoamylase pattern characterized by strong activity in the anodally migrating fraction (P_0-isoamylase) might serve as a diagnostic indication of pancreatic main duct occlusion or stenosis was investigated. Pancreatic serum isoamylases were analyzed by agarose gel electrophoresis in sera from 13 patients lacking P_0-isoamylase or having it at <30 U/l, 19 patients with P_0-isoamylase activity >30 U/l, and 23 patients with endoscopically diagnosed acute pancreatitis who had had P_0-isoamylase activities <30 U/l prior to onset of the disease. The first two patient groups underwent endoscopic retrograde cholangiopancreatography concomitantly with the enzyme determinations. Ten of the 13 patients with little or no P_0-isoamylase activity had normal pancreatograms, but 3 had pancreatitis plus stenosis or occlusion of the main pancreatic duct. Of the 19 patients with high P_0-isoamylase activity, 14 had total occlusion or stenosis of the main duct; 4 had liver, gallbladder, or pancreatic disease; and 1 had undiagnosed abdominal pain. Additionally, 18/19 had pathologically increased (45-175 U/l) total pancreatic serum amylase activity, and the P_0-isoamylase fraction constituted an average of 41% of the main activity. In the 23 cases of acute pancreatitis, P_0-isoamylase rose to only 14% of the main fraction. Almost all patients having P_0-isoamylase activity >20% of the main fraction had radiographic evidence of pancreatic main duct occlusion or stenosis with or without cysts and calculi and an increased total activity of serum pancreatic amylase. Such a finding is strong evidence of obstructive pancreatic disease, whereas findings of <20% may be regarded as normal.

4789 CURRENT STATUS OF THE SURGICAL MANAGEMENT OF ACUTE PANCREATITIS. (Ger.) Neher, M. (Chirurgische Klinik, Universitat Mainz, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):67-75; 1977.

4790 SURGICAL INDICATIONS FOR CHRONIC PANCREATITIS. (Fre.) Kiekens, R.; Kestens, P. J.; Cremer, M.; Dive, C. (Guldendal 11, B-1850 Grimbergen, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):547-552; 1976.

4791 TREATMENT OF CHRONIC PANCREATITIS WITH TRIPLE TOTAL BYPASS (PANCREAS, BILE DUCT, STOMACH). A TEN-YEAR EXPERIENCE. (Fre.) Salembier, Y. (Rue de la Louviere 69, F-59000 Lille, France). *Acta Gastroenterol. Belg.* 39(11/12):603-610; 1976.

4792 POSTOPERATIVE PANCREATITIS. (Rus.) Ganchev, G.; Ivanov, S.; Kyuchukev, I.; Kraev, Z. (Clin. Surgical Propedeutics, Inst. Surgery and Anesthesiology, Medical Acad., Sofia, Bulgaria). *Khirurgiia (Mosk.)* (11):44-48; 1976.

4793 EVOLUTION OF CHRONIC PANCREATITIS FOLLOWING SURGERY. (Fre.) Gastard, J.; Gosselin, M.; Hery, B.; Bretagne, J. F. (Hopital de Pontchaillou, rue Henri Le Guillou, 35000 Rennes, France). *Ann. Chir.* 30(10):838-841; 1976.

4794 FUNCTIONAL STATUS OF THE LARGE INTESTINE IN PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Zhukov, N. A.; Ostapenko, V. A.; Zybina, L. S. (Dept. Therapy, M. I. Kalinin Omsk Medical Inst., Omsk, USSR). *Klin. Med. (Mosk.)* 54(10):94-97; 1976.

4795 COLONIC CHANGES FOLLOWING PANCREATITIS. (Ger.) Lankisch, P. G.; Lopez, E.; Winckler, K.; Schuster, R. (Medizinische Universitatsklinik, Humboldtallee 1, 3400 Gottingen, W. Germany). *Dtsch. Med. Wochenschr.* 101(51):1885-1886; 1976.

4796 CYTOMORPHOLOGY OF CHRONIC PANCREATITIS WITH CONCURRENT PANCREATIC INJURY. (Rus.) Arutinunian, L. O. (Dept. Surgery, Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 16(6):86-92; 1976.

4797 HYDROKINETIC AND EXOCRINE PANCREAS FUNCTION FOLLOWING ACUTE PANCREATITIS. (Ger.) Tympner, F.; Domschke, W.; Rosch, W.; Koch, H.; Demling, L. (Medizinische Klinik, Universitat Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Z. Gastroenterol.* 14(7):684-687; 1976.

4798 PATHOGENESIS OF PERICARDIAC EFFUSIONS DURING CHRONIC PANCREATITIS [Letter to Editor]. (Fre.) Nataf, C.; Bernades, P.; Fruchaud, J.; Pascal, P.; Fekete, F. (Hopital Beaujon, 100, avenue General-Leclerc, F 92118 Clichy, France). *Nouv. Presse Med.* 6(24):2164; 1977.

4799 Giardia lamblia INFECTION AS A CAUSE OF ACUTE PANCREATITIS. (Pol.) Koszarska, J.; Gruszczynska, M.; Pilarska, K. (Klinika Endokrynologiczna i Chorob Przemiany Materii Pom. AM, ul. Arkonska 4, 70-252 Szczecin, Poland). *Wiad. Lek.* 30(11):875-877; 1977.

4800 ACUTE PANCREATITIS DURING Mycoplasma penumoniae INFECTION. (Ger.) Schmid, E.; Blaich, E. (II. Innere Abteilung des Kreiskrankenhauses, Eberhardtstrasse, D-7320 Goppingen, W. Germany). *Z. Gastroenterol.* 14(5):536-537; 1976.

See also, 4409, 4570, 4573, 4575, 4589, 4599, 4782, 4811, 4822, 4978, 4992, 5037, 5038, 5052.

4801 SIGNIFICANCE OF CHANGES IN BLOOD PRESSURE AND PULSE RATE AFTER PERCUTANEOUS LIVER BIOPSY. (Eng.) Middleton, H. M., III; Griffin, J. W., Jr.; Gabilondo, J. C.; Adams, H. W. (Veterans Admin. Hosp., Augusta, GA 30904). *Am. J. Dig. Dis.* 22(11):989-994; 1977.

Changes in blood pressure and pulse rate were evaluated prospectively in 50 patients undergoing uncomplicated liver biopsies and retrospectively in 4 patients who, since 1973, had recognized postbiopsy hemorrhage requiring transfusion. In uncomplicated biopsies, a wide range of variations in vital signs was encountered between "baseline" and "before" controls and between controls and postbiopsy measurements. To place the changes in perspective, percentile scales were developed for percent maximum deviation from control for systolic blood pressure, diastolic blood pressure, and pulse rate. Analysis of changes in patients with significant hemorrhage revealed marked changes in vital signs in the early (2-hr) postbiopsy period, and the association of early hypertensive changes with pain followed by later evidence of hemorrhage in two of the four patients. A change in the pulse rate occurred in only one of the four bleeders, while blood pressure changed in all four. Substantial changes from prebiopsy control values will occasionally occur and may or may not be associated with clinically significant hemorrhage. Any significant deviation, however, warrants an assessment.

4802 SIGNIFICANCE OF ALPHA$_1$-FETOPROTEIN IN THE ASSESSMENT OF HEPATOCYTE REGENERATION CAPACITY IN INFANCY AND CHILDHOOD. (Hun.) Balogh, T.; Bajtai, G.; Ambrus, M.; Peley, I.; Kadas, I.; Varga, L. (Vertranzfuzios Allomas, Baranya megyei Korhaz, Pecs, Hungary). *Orv. Hetil.* 118(47):2815-2818; 1977.

The serum alpha$_1$-fetoprotein (AFP) levels were studied in 134 0- to 42-day-old babies with respiratory infections (rhinitis, acute bronchitis, spastic bronchitis) and intact liver and in 62 4- to 56-day-old babies with perinatal hepatitis attended by IgM hypergammaglobulinemia. The AFP levels were lowest in intact controls, higher in the patients with intact liver, and highest in the patients with perinatal hepatitis. The AFP level was highest during the acute phase of the lesion of the hepatic parenchyma, and its decrease was parallel with the regeneration of the liver parenchyma. The findings show that the AFP test may be suitable for the assessment of the progression of the regeneration of the hepatocytes following necrosis.

4803 IMMUNOLOGY OF CHRONIC LIVER DISEASES. (Ger.) Berg, P. A. (Medizinische Universitatsklinik, Otfried-Muller-Strasse, 7400 Tubingen, W. Germany). *Therapiewoche* 27(38):6551-6567, *passim*; 1977.

Studies on the immunological aspects of chronic liver diseases are reviewed. The destruction of hepatocytes seen in hepatitis B surface antigen (HBsAg)-positive and -negative acute and chronic hepatitis can be assumed to be primarily due to immune reactions. While T-cell-mediated cytotoxicity may play a dominant role in the acute stage of these diseases, the chronic inflammation is sustained by mechanisms involving antibodies, lymphokines, and perhaps immune complexes, thereby leading to the activation of unspecific inflammatory cells (antibody-mediated cytotoxic reactions). The target antigens are probably virus-associated antigens against the hepatocyte membrane, and the organ-specific membrane lipoprotein antigen (LSP antigen). The presence of organ-specific autoantibodies to liver-specific membrane lipoprotein in HBsAg-negative hepatitis; the absence of specific antiviral antibodies in various forms of autoimmune hepatitis, such as lupoid hepatitis, cholestatic chronic aggressive hepatitis, and primary biliary cirrhosis; and the predominance of HLA-B8 and HLA-B12 antigens in HBsAg-negative chronic active hepatitis indicate that hepatitis A or B virus infection is not likely to play any causative role in these diseases, i.e., autoimmune hepatitis is etiologically different from HBsAg-positive hepatitis. The causes of the chronic course are unknown. Disturbance in immune regulation in autoimmune hepatitis, possibly as a consequence of suppressor cell defect, seems likely. An additional stimulation by an autoantigen that has escaped tolerance may also play a role along with genetic factors. The steady activation of the immune system can be assumed to be due to noneliminated, virus-associated antigens in HBsAg-positive hepatitis. In these cases, there may be an impairment in antigen elimination, which may also be explained by a genetic defect. Immunosuppressive therapy is indicated in autoimmune hepatitis, except for primary biliary cirrhosis, but it is of doubtful value in HBsAg-positive hepatitis.

4804 IMMUNOLOGICAL ABNORMALITIES ASSOCIATED WITH LIVER DISEASE: CAUSE OR EFFECT? (Eng.) Smith, C. I.; Cooksley, W. G. E.; Powell, L. W. (Royal Brisbane Hosp., Herston Rd., Brisbane, Queensland 4029, Australia). *Aust. N.Z. J. Med.* 7(6):604-612; 1977.

The literature concerning immunological abnormalities associated with liver disease is reviewed. Liver damage with which these abnormalities may occur may be (a) nonspecific and unrelated to pathogenesis, e.g., caused by auto-antibodies such as antinuclear factor; (b) specifically directed against liver antigens but not pathogenetic, e.g., cell-mediated immune (CMI) reactions to liver antigen as seen in experimental carbon tetrachloride poisoning; (c) of such a nature as to modify the pathology produced by hepatotoxic agents, e.g., caused by hepatitis B virus or alcohol; or (d) primarily responsible for hepatic pathology, e.g., idiopathic chronic active hepatitis. The latter

two possibilities remain unproven, although there is growing evidence that immune responses do play some role in the pathogenesis of acute and chronic hepatitis B and possibly also in the pathogenesis of alcoholic liver disease. It seems much less likely that primary abnormalities of the immune systems are responsible for any type of liver disease. The available evidence suggests that immune reactions could develop as a consequence of liver damage, and only in certain circumstances do these reactions play a role in the development and continuation of hepatic pathology.

4805 DEVELOPMENT, VALIDATION, AND APPLICATION OF A SINGLE-TUBE RADIOIMMUNOASSAY FOR CHOLIC AND CHENODEOXYCHOLIC CONJUGATED BILE ACIDS IN HUMAN SERUM. (Eng.) Roda, A.; Roda, E.; Aldini, R.; Festi, D.; Mazzella, G.; Sama, C.; *et al.* (S. Orsola Hosp., Via Massarenti, 9, 40138 Bologna, Italy). *Clin. Chem.* 23(11):2107-2113; 1977.

The development, validation, and application of a single-tube radioimmunoassay for both cholic acid and chenodeoxycholic acid conjugates in serum are described. The method is based on the use of [1-^{14}C]glycocholic acid and [U-^{3}H]glycochenodeoxycholic acid as tracers. The assay was shown to be specific, sensitive, accurate, and precise when used for serum samples from 20 control subjects and 40 patients with increased bile acid in the serum because of liver disease, and the results correlated well with those by gas chromatography (r=0.99).

4806 BILE SALT METABOLISM. II. BILE SALTS AND DISEASE. (Eng.) Campbell, C. B.; Cowen, A. E. (Christchurch Clinical Sch., Christchurch, New Zealand). *Aust. N.Z. J. Med.* 7(6): 587-595; 1977.

Present knowledge of bile salt metabolism in disease is reviewed, and its clinical importance is discussed. Liver damage results in elevated serum bile salt concentrations, which may be useful as a sensitive index of hepatocellular disease. Changes in the relative proportions of the individual bile salts in serum occur with cholestasis. Urinary excretion of bile salts, largely in the form of sulfates, increases as a compensatory mechanism. Ileal disease or resection causes bile salt malabsorption. The increase in colonic bile salts produces watery diarrhea, while the decrease in duodenal levels may cause steatorrhea. Cholelithiasis may result from alteration in the relative proportions of cholesterol, lecithin, and bile salts in bile. The mechanism apparently differs in various conditions predisposing to gallstone formation. A primary alteration of bile salt metabolism has been postulated in several other conditions. Considerable interest centers on the importance of metabolites of bile salts in the pathogenesis of colonic carcinoma. Chenodeoxycholic acid is a successful, although costly treatment for selected patients with cholesterol gallstones. Bile salt binding agents, such as cholestyramine, are extremely useful especially in the control of pruritus in patients with cholestasis.

4807 DETERMINATION OF PERIPHERAL BLOOD LEUKOCYTE ALKALINE PHOSPHATASE AND PEROXIDASE IN PATIENTS WITH LESIONS OF THE LIVER AND BILIARY TRACT. (Rus.) Podil'chak, L. M. (Medical Inst., Lvov, USSR). *Vrach. Delo* (9):96-98; 1977.

The diagnostic value of neutrophil alkaline phosphatase (AP) and peroxidase (PO) determinations was studied in 84 patients with infectious hepatitis and bile duct lesions. The highest AP activity was detected in patients with acute destructive cholecystitis, 230.0% compared to 197.3% in patients with cancer of the pancreas head, 180.3% in patients with cholelithiasis complicated by obstructive jaundice, 46.1% in patients with chronic cholecystitis, 21.3% in patients with infectious hepatitis, and 35.1% in healthy controls. The activity of PO was increased only in the patients with infectious hepatitis and destructive cholecystitis.

4808 RED BLOOD CELL TRANSKETOLASE ACTIVITY AND THE EFFECT OF THIAMINE SUPPLEMENTATION IN PATIENTS WITH CHRONIC LIVER DISEASE. (Eng.) Rossouw, J. E.; Labadarios, D.; Krasner, N.; Davis, M.; Williams, R. (Natl. Res. Inst. Nutritional Diseases, Tygerberg, South Africa). *Scand. J. Gastroenterol.* 13(2):133-138; 1978.

Thiamine nutrition was assessed in 17 patients with alcoholic cirrhosis and 14 patients with nonalcoholic chronic liver disease, and the effect of thiamine supplementation was investigated. Biochemical evidence of thiamine deficiency was found in 58% of patients with chronic liver disease, the incidence being higher in alcoholic than in nonalcoholic patients (70.6% versus 42.8%, $p<0.05$). Supplementation with high doses of thiamine hydrochloride (200 mg/day) for 1 week restored levels of thiamine pyrophosphate (TPP), the active coenzyme form of thiamine, to normal in all cases. Such supplementation also stimulated synthesis of the TPP-dependent enzyme, transketolase. Because of the essential role of TPP as a cofactor in intermediary metabolism, it is concluded that high doses of thiamine should be included in the routine nutritional management of patients with severe chronic liver disease.

4809 RATIO OF URINARY 6β-HYDROXYCORTISOL TO 17-HYDROXYCORTICOSTEROIDS IN PATIENTS WITH LIVER DISEASE. (Eng.) Eade, O. E.; Maddison, A.; Leonard, P. J.; Wright, R. (Southampton Univ. Hosp., Tremona Rd., Southampton SO9 4XY, England). *Digestion* 16(1/2):169-174; 1977.

To evaluate the extent to which microsomal enzyme induction in liver diseases could be demonstrated using the ratio of 6β-hydroxycortisol to 17-hydroxy-

corticosteroids in the urine, this ratio was measured in 73 patients with liver disease and in 53 controls. The mean ratio was significantly greater in the patients with liver disease than in the controls (60 ± 5.5 versus 19 ± 2.4, $p<0.001$). This elevation was most marked among patients with liver metastases (85 ± 24.6, $p<0.05$) and patients with acute hepatitis. The use of this ratio as a test of early liver cell dysfunction requires further evaluation.

4810 THE PLASMA LEVELS OF 25-HYDROXYVITAMIN D IN PATIENTS WITH VARIOUS LIVER DISEASES AND THE RESPONSE OF 25-HYDROXYVITAMIN D TO VITAMIN D TREATMENT. (Eng.) Seino, Y.; Shimotsuji, T.; Kai, H.; Ikehara, C.; Yabuuchi, H. (Osaka Univ. Medical Sch., 1-1-50, Fukushima Fukushima-ku, Osaka, Japan 553). *Acta Paediatr. Scand.* 67(1):39-42; 1978.

The mean plasma levels of 25-hydroxy-vitamin D (25-OH-D) were measured before and after the administration of 2,000 U of daily p.o. vitamin D_2 for a period of 2 weeks in nine normal infants and children, seven infants with neonatal hepatitis and persistent neonatal hepatitis, and four infants with congenital biliary atresia. The mean plasma level of 25-OH-D increased significantly from 19.5 ± 3.7 ng/ml 34.0 ± 6.8 ng/ml in controls ($p<0.05$) after vitamin D_2 administration. The mean plasma level of 25-OH-D also increased from 8.0 ± 2.1 ng/ml to 22.1 ± 2.6 ng/ml after vitamin D treatment in the hepatitis group ($p<0.05$). In patients with congenital biliary atresia, vitamin D treatment did not affect the 25-OH-D plasma levels. The results suggest that patients with neonatal hepatitis should be maintained on supplemental vitamin D uptake with adjustments to individual requirements.

4811 PANCREATIC HYPERSECRETION IN LIVER DISEASE. (Eng.) Gregg, J. A.; Sharma, M. M. (110 Francis St., Boston, MA 02215). *Am. J. Dig. Dis.* 23(1):9-11; 1978.

To determine whether the liver or the pancreas is involved in the production of abnormally large duodenal aspirates observed in many patients with liver cirrhosis, 11 cirrhotic patients and 1 patient with cholestatic hepatitis underwent an intraductal secretin test during endoscopic cannulation of the pancreatic duct. Six patients with cirrhosis had pancreatic hypersecretion ranging from 7.8 to 26.0 ml/min, while three patients demonstrated low secretory flow rates. Bile flow was negligible or nonexistent in 10 patients, while in 2 others, larger but unmeasurable amounts of bile secretion were present. This study conclusively demonstrates that pancreatic hypersecretion may occur in patients with cirrhosis during secretin stimulation. Impaired secretin metabolism or the associated pancreatic hypersecretion of early pancreatitis may be responsible for this finding.

4812 LIVER DISEASE IN RENAL TRANSPLANT RECIPIENTS. (Eng.) Sopko, J.; Anuras, S. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Am. J. Med.* 64(1):139-146; 1978.

Information concerning liver disease as a complication of renal transplantation is reviewed. Liver disease is a common complication in renal transplant recipients. The most common liver diseases are acute and chronic hepatitis. The varieties of acute hepatitis include hepatitis A, hepatitis B, cytomegalovirus hepatitis, herpes simplex hepatitis, and azathioprine hepatitis. The incidence of azathioprine hepatitis may not be as high as initially suggested. Chronic hepatitis is a serious problem because the disease seems to be progressive despite prednisone therapy. The causes of this chronic hepatitis are not fully known, although hepatitis B, cytomegalovirus, and herpes simplex virus have been implicated. Discontinuation of azathioprine therapy has no appreciable effect on the course of chronic hepatitis.

4813 ULTRASTRUCTURE OF THE LIVER IN A CASE OF CHILDHOOD CYSTINOSIS. (Eng.) Scotto, J. M.; Stralin, H. G. (Hopital d'Enfants, F-94270 Le Kremlin-Bicetre, France). *Virchows Arch. [Pathol. Anat.]* 377(1):43-48; 1977.

The liver was studied ultrastructurally in a case of childhood cystinosis. Crystalline structures were found mainly in Kupffer cells. The presence of dark cells, with or without crystals, was the most striking feature observed. Identical dark material was also found extracellularly. These data show that free cystine can fill cell cytoplasm and extracellular spaces, and the possibility that cystine overproduction may take place in the hyaloplasm should be considered. The extracellular location of cystine in the tubules might account for an increase in epithelial permeability.

4814 ABNORMAL SIALIC ACID CONTENT OF THE DYSFIBRINOGENEMIA ASSOCIATED WITH LIVER DISEASE. (Eng.) Martinez, J.; Palascak, J. E.; Kwasniak, D. (Jefferson Medical Coll.-Thomas Jefferson Univ., Philadelphia, PA 19107). *J. Clin. Invest.* 61(2):535-538; 1978.

To evaluate the possibility that the carbohydrate composition of fibrinogen may be altered in the dysfibrinogenemia associated with liver disease, the sialic acid content of purified fibrinogen from 12 patients with liver disease and its relation to the prolongation of the thrombin time were studied. Purified fibrinogen showed intact Aα-, Bβ-, and γ-chains when reduced and analyzed by sodium dodecyl sulfate-polyacrylamide gel electrophoresis and exhibited prolongation of the thrombin time similar to that of the plasma from which it was derived. Sialic acid content of the purified fibrinogen ranged from 12.7% to 71.4% higher in patient fibrinogens when compared to those of normal controls. A progressive delay in thrombin time was associated with increasing sialic acid content of the patient fibrinogen. Enzymatic removal of sialic acid from four of the abnormal fibrinogens resulted in a shortening of their thrombin times to

the range of the desialylated normal control. PAS reagent stained only the Bβ- and γ-chains of the reduced patient fibrinogens after sodium dodecyl sulfate-polyacrylamide gel electrophoresis, suggesting that the excess sialic acid is located on these two chains. These studies demonstrate a biochemical alteration of the functionally abnormal fibrinogen found in some patients with liver disease, and indicate that the excess sialic acid plays an important role in the functional defect of this protein.

4815 FAMILIAL SYNDROME OF PROGRESSIVE CONE DYSTROPHY, DEGENERATIVE LIVER DISEASE AND ENDOCRINE DYSFUNCTION. II. CLINICAL AND METABOLIC STUDIES. (Eng.) Larsen, I. F.; Hansen, E.; Berg, K. (Univ. Hosp., Rikshospitalet, Oslo, Norway). *Clin. Genet.* 13(2):176-189; 1978.

Six female patients from two sibships in a family with a high degree of consanguinity and a male patient from another family, all of whom have a new syndrome of total color blindness (progressive cone dystrophy), liver degeneration, and endocrine dysfunction, are described. The patients showed endocrine defects at different levels of regulation. None of the patients had children; two were probably infertile and three had had repeated spontaneous abortions. Two patients had primary hypothyroidism and two others had low normal thyroid function with protracted thyrotropin-releasing hormone (TRH) test response, indicating a hypothalamic disorder. A defect in the ACTH reserve, as tested by Metyrapone®, was found in two patients. Diabetes mellitus of the "maturity-onset type diabetes of the young" was observed in three patients, and a fourth had a borderline glucose tolerance with further impairment during pregnancy. Hypertension was observed in the diabetic patients. Diabetes was seldom present among the relatives, but hypertension occurred frequently. Four patients had liver degeneration, demonstrated by elevated levels of transaminases and unspecific parenchymal degeneration, fatty infiltration, and isolated liver cell necrosis in the biopsy. All patients, except the youngest (age 12 yr), had progressive hearing loss, classified in four cases as neurogenous and probably cochlear. In the boy (age 17 yr), the hearing loss was a neurogenous congenital hypacusis. There were several cases of hearing defects among the relatives, so it is difficult to relate this to the syndrome. Enlarged sella turcica were found in three patients and in one of these an "empty sella" was demonstrated by surgery. Elevated creatine phosphokinase was also observed. All the different lesions suggest a systemic disorder, possibly a membrane defect.

4816 FAMILIAL SYNDROME OF PROGRESSIVE CONE DYSTROPHY, DEGENERATIVE LIVER DISEASE, AND ENDOCRINE DYSFUNCTION. III. GENETIC STUDIES. (Eng.) Berg, K.; Larsen, I. F.; Hansen, E. (Inst. Medical Genetics, Univ. Oslo, Blindern, Oslo 3, Norway). *Clin. Genet.* 13(2):190-200; 1978.

A syndrome of progressive cone dystrophy, endocrine dysfunction, and degenerative liver disease is described in seven patients, six of whom belonged to one extensive kindred. Liver disease, an unspecific toxic pattern, with degenerative changes and fatty infiltration, was demonstrated in all four patients subjected to liver biopsy. However, liver function was satisfactory in all patients. Genetic analyses revealed a segregation ratio indicating autosomal recessive inheritance of the syndrome, and the kindred from which six of the seven patients originated was heavily inbred. Thus, the results of the segregation analyses as well as of the inbreeding analyses provide evidence that this previously unrecognized disorder is inherited as an autosomal recessive trait. Genetic marker analyses were conducted with respect to 22 marker systems, and linkage information was obtained with respect to 15 of them. No strong suggestion of linkage emerged from the analyses, but very close linkage could be excluded for several of the genetic marker systems. Pedigree analysis was helpful in establishing the spectrum of clinical manifestations belonging to the syndrome proper. The data suggest that elevated levels of creatine phosphokinase, which were found in all patients, may be useful in tracing heterozygotes for this disorder.

4817 PSEUDO-BUDD-CHIARI SYNDROME. (Eng.) Dhawan, V. M.; Sziklas, J. J.; Spencer, R. P. (Univ. Connecticut Health Center, Farmington, CT 06032). *Clin. Nucl. Med.* 3(1):30-31; 1978.

The case of a 67-yr-old man with clinical, laboratory, radiographic, and scintigraphic findings resembling the Budd-Chiari syndrome is described. However, at autopsy there was no thrombotic occlusion of any of the intrahepatic veins. The right hepatic vein was completely constricted by the hypertrophied left lobe of the liver, and the left hepatic vein was narrowed. The authors have referred to this clinical entity as the pseudo-Budd-Chiari syndrome. It represents a potentially treatable form of the Budd-Chiari syndrome.

4818 DETECTION OF HEPATOCELLULAR CARCINOMA DURING A CLINICAL FOLLOW-UP OF CHRONIC LIVER DISEASE: OBSERVATIONS IN 31 PATIENTS. (Eng.) Kubo, Y.; Okuda, K.; Musha, H.; Nakashima, T. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Gastroenterology* 74(3):578-582; 1978.

Clinical and pathological findings are presented for 31 patients with an initial diagnosis of cirrhosis or chronic hepatitis in whom hepatocellular carcinoma (HCC) was detected after a clinical follow-up of 8 months to 14 yr (average 59 months). They had had no scintigraphic and biochemical abnormalities suggestive of HCC at the beginning of the follow-up period. The follow-up period before the detection of carcinoma was shorter in patients positive for hepatitis B surface antigen (HBsAg) compared with those negative for HBsAg. Analyses of clinical data during the follow-up and liver scans made shortly before tumor detection suggested that in most of these patients HCC became discernible relatively early in the course of cirrhosis

or long before cirrhosis reached an advanced stage. A sharp rise in serum α-fetoprotein level proved highly diagnostic in 11, it remained low throughout in 7, and tumor was already unresectable in the majority. Although continuous and regular check for α-fetoprotein is imperative in patients with chronic liver disease, particularly in those with hepatitis B surface antigenemia, additional diagnostic tools are necessary for the detection of small HCC in its resectable stage.

4819 INCIDENCE IN SOUTH-WEST SCOTLAND OF HEPATITIS B SURFACE ANTIGEN IN THE LIVER OF PATIENTS WITH HEPATOCELLULAR CARCINOMA. (Eng.) Turbitt, M. L.; Patrick, R. S.; Goudie, R. B.; Buchanan, W. M. (Glasgow Royal Infirmary, Glasgow, Scotland). *J. Clin. Pathol.* 30(12):1124-1128; 1977.

To examine the possible relationship between hepatitis B surface antigenemia and the occurrence of primary hepatocellular carcinoma, the incidence of hepatitis B surface antigenemia was determined in the livers of 81 patients with PHC, 82 patients with cirrhosis, and 112 controls in Southwest Scotland. A retrospective examination of formalin-fixed paraffin-embedded liver tissue by an immunoperoxidase technique revealed hepatitis B surface antigen (HBsAg) in eight cases of PHC and in four cases of cirrhosis. No positive staining was found in the 112 controls without overt liver disease matched for age and sex. Unlike most previous studies showing an association between HBsAg and PHC, the present investigation was carried out in an area where HBs antigenemia is infrequent and PHC is an uncommon tumor. While hepatitis infection is possibly an important cause of PHC, the association between HBsAg and PHC could be due merely to activation by the tumor of latent virus B in a previously infected person.

4820 PRIMARY LIVER TUMORS AND ORAL CONTRACEPTIVES: RESULTS OF A SURVEY. (Eng.) Vana, J.; Murphy, G. P.; Aronoff, B. L.; Baker, H. W. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263). *JAMA* 238(20):2154-2158; 1977.

Data on cases of primary liver tumors (378 women, 165 men) reported by 477 hospitals in the United States during 1970 to 1975 were reviewed to define the relation between primary liver tumors and oral contraceptives. In men, 91.5% of the tumors were malignant, whereas in women, only 43.9% were malignant. Of the 212 benign tumors in women, 96 were hepatic cell adenomas and 58 were focal nodular hyperplasias. A history of oral contraceptive use was found in nearly half of all women: 65% with benign tumors, 74% with hepatic cell adenomas, and 74% with focal nodular hyperplasias. Symptoms were more severe among contraceptive users. No case of bleeding was observed in nonusers. The findings confirm the suggested association between oral contraceptive use and hepatic cell adenomas and focal nodular hyperplasias.

4821 HEPATIC LOCALIZATION OF MALIGNANT SCHWANNOMA (Fre.) Heully, F.; Gaucher, P.; Pointel, J. P.; Bigard, M. A.; Bach, D.; Rauber, G.; *et al.* (Clinique Gastro-Enterologique, Nancy, France). *Ann. Med. Nancy* 15:1153-1162; 1976.

A case of malignant hepatic schwannoma is reported in a 50-yr-old woman who had a mediastinal neurofibrosarcoma surgically removed 9 yr previously. There was no evidence of cutaneous neurofibromatosis or of a recurrence of the mediastinal tumor. A laparotomy revealed a voluminous inoperable hepatic tumor. Light and electron microscopy of biopsies confirmed a malignant neurofibromatous tumor with atypical proliferating functional cells. A review of the literature shows only 13 cases of hepatic schwannomas; these cases are summarized in tabular form. The diagnosis can only be confirmed by endoscopic biopsy, even though this procedure often accelerates tumor evolution. Treatment is essentially surgical, possibly with postoperative radiotherapy.

4822 HEPATIC DYSFUNCTION DURING HYPERALIMENTATION. (Eng.) Sheldon, G. F.; Petersen, S. R.; Sanders, R. (San Francisco General Hosp., San Francisco, CA 94110). *Arch. Surg.* 113 (3):504-508; 1978.

Liver biopsy specimens were studied in 26 patients in whom liver function abnormalities developed during i.v. hyperalimentation (IVH). The clinical manifestations and duration of IVH were evaluated in relation to the morphological changes seen in the liver. Early hepatic changes consisted of fatty metamorphosis, present in eight of nine patients whose liver biopsy specimens were obtained within 5 days. In two patients, evidence of intrahepatic cholestasis developed after 5 days of IVH. Biopsy specimens examined after 10 days of the IVH regimen in four of seven patients showed lesser degrees of fatty infiltration than in patients receiving IVH for shorter intervals. Bile duct proliferation, bile plugs within canaliculi, centrilobular cholestasis, and pigment accumulation within hepatocytes were observed after 21 days of IVH. Specimens from patients who had received IVH for over 3 weeks showed periportal inflammation and persistent intrahepatic cholestasis. The authors propose that essential fatty acid deficiency, amino acid imbalance, caloric excess, and toxic manifestations of certain amino acids may be causative factors of these phenomena. Hepatic steatosis secondary to IVH may be treated by lowering the dextrose concentration of the infusion or by administering dextrose-free amino acid solutions. The clinical importance of this common complication of IVH is the difficulty in distinguishing it from other causes of cholestasis in seriously ill patients.

4823 CLINICAL AND MORPHOLOGICAL FINDINGS IN RECURRENT INTRAHEPATIC CHOLESTASIS IN CHILDHOOD AND ITS DIFFERENTIAL DIAGNOSIS. (Ger.) Gathmann, A. H.; Tulusan, A. H.; Osswald, P. (Pathologisches Institut der Universitat, Krankenhaus-

strasse 8-10, 8520 Erlangen, W. Germany). *Therapiewoche* 27(39):6730-6732; 1977.

The clinical and morphological aspects of recurrent intrahepatic cholestasis were studied in two children aged 3 and 4.5 yr. Pruritus and symptoms suggestive of mechanical obstructive jaundice were the first symptoms in both cases, whereas the intrahepatic and extrahepatic bile ducts were intact. Numerous giant cells of reactive origin were found in a liver biopsy specimen from one patient. Bile pigment was seen mostly in the greatly dilated canaliculi. Pathogenetically, the increase of bile acids, followed by the accumulation of bilirubin-bile acid complexes in the canaliculi, as well as the partial interruption of the enterohepatic circulation, are important factors.

4824 REPORT OF A CASE OF BENIGN RECURRENT INTRAHEPATIC CHOLESTASIS (TYGSTRUP-SUMMERSKILL AND WALSHE SYNDROME). (Ger.) Schmeisser, W.; Eggstein, M.; Maulbetsch, R.; Dolle, W. (Abteilung I Innere Medizin, Medizinische Universitatsklinik, Tubingen, W. Germany). *Schweiz. Med. Wochenschr.* 107(45):1613-1620; 1977.

A typical case of benign recurrent intrahepatic cholestasis in a 22-yr-old man is reported. and 65 cases known from the literature are reviewed. The patient, who had nine attacks of pruritus and jaundice, was 10 yr old at the time of the first attack. Some of the attacks were typically triggered by infections. Nausea, emesis, diarrhea, dark brown urine, increased alkaline phosphatase level, and slightly increased transaminase levels with bilirubinemia were the characteristic symptoms. The intrahepatic and extrahepatic bile ducts were intact. The serum gamma-glutamyltranspeptidase activity was nearly normal. Nonspecific mesenchymal reaction of the liver was seen during the asymptomatic periods. The analysis of the literature shows that most patients had their first jaundice attack before puberty, which is then followed by up to 27 attacks with durations of 2 week to 60 months. The length of the asymptomatic intervals was 2 months to 20 yr.

4825 INTRAHEPATIC CHOLESTASIS OF PREGNANCY. A STUDY BASED ON 59 CASES. (Fre.) Creze, B.; Creze, J.; Joubaud, F.; Denis, A.; Rouchy, R. (Service de Clinique Obstetricale et Gynecologique, CHU, 49036 Angers Cedex, France). *Rev. Franc. Gynecol. Obstet.* 71(5):317-328; 1976.

Hepatogestosis or idiopathic intrahepatic cholestasis of pregnancy (IICP) was studied in 59 cases. IICP occurred during the third trimester of pregnancy and was associated with pruritus in 28 women and with pruritus and icterus in 31. The levels of alkaline phosphatase and lactic dehydrogenase (LDH) were significantly elevated in all cases tested. SGOT and SGPT were more elevated in women with icterus than in those with simple pruritus (200 U versus 143 U and 214 U versus 126 U, resp.). Biopsy showed local, centrilobular cholestasis, and electron microscopy demonstrated alterations of biliary pole villi of hepatocytes. There was no necrosis or inflammatory process. Amniotic fluid was often discolored and/or contained meconium. Although the women recovered promptly after parturition, the fetal prognosis was adversely affected, mainly because of premature births (41/59 cases). The high instance of prematurity may be ascribed to the high level of bile salts in these women (27 mg/l versus 0.87 mg/l during normal pregnancy). There were also five deaths *in utero*. Since there was no correlation between the severity of the disease in the mother and its effect on the fetus, and since the efficacy of treatment with neurosedatives, antihistamines, and bile acid chelators was inconsistent, a very strict surveillance of women with these high risk pregnancies is recommended as the best method to reduce fetal mortality and morbidity.

4826 PATHOPHYSIOLOGY OF HYPOTENSION IN PATIENTS WITH FULMINANT HEPATIC FAILURE. (Eng.) Trewby, P. N.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(12):1021-1026; 1977.

The incidence and pathophysiology of hypotension was studied in 94 patients with fulminant hepatic failure. Eighty-two patients developed arterial hypotension with a systolic blood pressure of less than 80 mm Hg. Such episodes accounted for 16% of the total time spent in grade IV coma. Factors such as hemorrhage, cardiac or respiratory abnormalities, extracorporeal perfusion, or hypotension that occurred during the terminal stages of the illness could be implicated for only 40% of this time, leaving 60% as unexplained. Further investigation of these unexplained factors showed that peripheral vasodilatation rather than primary heart failure was responsible, and in all but three patients the construction of ventricular function curves showed a normal ventricular response to volume expansion with a corresponding increase in blood pressure. A small, but significant ($p<0.001$), slowing of the heart rate occurred during these periods of unexplained hypotension. This slowing, together with the association that was found between the occurrence of hypotension and cerebral edema with coning ($p<0.02$), suggests that central vasomotor depression may be important in the pathogenesis of the unexplained hypotension.

4827 SERUM OCTOPAMINE, COMA, AND CHARCOAL HAEMOPERFUSION IN FULMINANT HEPATIC FAILURE. (Eng.) Chase, R. A.; Trewby, P. N.; Davis, M.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5 England). *Eur. J. Clin. Invest.* 7(5):351-354; 1977.

Serum and urinary octopamine levels were studied in 20 patients with fulminant hepatic failure (FHF), and the possible influence of renal insufficiency in the alteration of these levels in FHF was investigated. Serum octopamine levels were significantly higher in the patients with FHF during the first

48 hr of grade IV coma than in healthy controls (3.38 ± 0.20 ng/ml and 1.75 ± 0.19 ng/ml, resp., $p<0.001$). Serial measurements in five patients who died without regaining consciousness showed serum octopamine to remain raised (3.36 ± 0.13 ng/ml), and concentrations in the cerebrospinal fluid at death (3.18 ± 0.32 ng/ml) reflected serum levels. In five patients who regained consciousness, improvement in encephalopathy was associated with a significant reduction in serum octopamine. Renal failure in patients with FHF was found to contribute to raised serum octopamine but could not alone account for the observed levels. Patients given neomycin therapy did not have significantly lower serum octopamine levels than an untreated group. There was, however, a significant correlation ($p<0.002$) between elevated serum octopamine and the occurrence of gastrointestinal bleeding during the previous 24 hr. Charcoal hemoperfusion did not appreciably reduce serum octopamine levels.

4828 PLATELET FUNCTION IN FULMINANT HEPATIC FAILURE AND EFFECT OF CHARCOAL HAEMOPERFUSION. (Eng.) Weston, M. J.; Langley, P. G.; Rubin, M. H.; Hanid, M. A.; Mellon, P.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, England). *Gut* 18(11):897-902; 1977.

Platelet function was studied in 34 patients with fulminant hepatic failure, and the effects of charcoal hemoperfusion were evaluated. In addition to being reduced in number in comparison with those in controls (157.1 ± 91.5 x 10^9/l versus 255.3 ± 84.4 x 10^9/l in controls, $p<0.005$), the platelets were also smaller (mean median volumes of 5.91 ± 0.99 fl and 6.6 ± 0.69 fl in patients and controls, resp., $p<0.005$). In keeping with these findings, capillary bleeding times were significantly longer in the patients compared with the controls (17.7 ± 9.6 min and 6.96 ± 1.6 min, resp., $p<0.001$) than could be accounted for by reduction in platelet numbers alone. In 19 patients who underwent hemoperfusion for temporary liver support, the capillary bleeding time was doubled, despite only a small drop in arterial platelet counts. This disproportionate prolongation of bleeding time was almost certainly caused by the loss of larger platelets in the charcoal columns during perfusion, as the mean median volume also fell during perfusion. Rises in screen filtration pressure of the blood leaving the columns were found during some perfusions and thought to be indicative of platelet aggregates. Release of vasoactive substances from platelets could account for the hypotension often found at this time.

4829 TREATMENT OF IRON OVERLOAD IN ADULTS WITH CONTINUOUS PARENTERAL DESFERRIOXAMINE. (Eng.) Cooper, B.; Bunn, H. F.; Propper, R. D.; Nathan, D. G.; Rosenthal, D. S.; Moloney, W. C. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Am. J. Med.* 63(6):958-966; 1977.

Five adult patients with transfusional hemosiderosis were given ascorbic acid (500 mg/day, p.o.) and treated with the iron chelator, desferrioxamine B (0.75-2.25 g/day). The drug was administered by continuous s.c. or i.v. infusions using a lightweight portable constant infusion device. On this regimen, four of the five patients were able to excrete significant amounts of iron (>35 mg/day) when receiving a daily desferrioxamine dose of 1.5 to 2.2 g. Continuous s.c. infusion was well tolerated and about 80% as effective as i.v. therapy in chelating iron. The number of prior transfusions, the hepatic iron content, and the serum ferritin levels appear to be useful in predicting which patients will respond to iron chelation therapy, especially if there is little bone marrow erythropoietic activity. One patient with ineffective erythropoiesis did not have significantly increased hepatic iron stores but responded to the administration of desferrioxamine. Continuous s.c. administration of desferrioxamine may prove to be adaptable for long-term outpatient therapy, allowing patients with ongoing transfusion requirements to go into negative iron balance.

4830 VASCULAR ALTERATIONS IN FOCAL NODULAR HYPERPLASIA OF THE LIVER. (Eng.) Travers, H.; D'Amato, N. A. (Naval Regional Medical Center, Portsmouth, VA 23708). *Milit. Med.* 143(2): 96-101; 1978.

Vascular alterations were studied in 11 cases of focal nodular hyperplasia (FNH) of the liver and 2 cases of hepatic adenoma. Variable intimal and medial hyperplasia with fragmentation of elastic laminae occurred in both arteries and veins in FNH. These changes were not found in hepatic adenoma. From these cases and those reported in the literature, together with the results of studies of the arteriographic appearance of FNH and the recently reported association of the lesion with oral contraceptive use, it is concluded that FNH arises as an hepatic reaction to injury induced by local vascular abnormalities, conceivably exacerbated by the administration of oral contraceptives.

4831 INHERITANCE OF PORPHYRIA CUTANEA TARDA: ANALYSIS OF 14 CASES IN 5 FAMILIES. (Eng.) Topi, G.; Gandolfo, L. D. (Dept. Experimental Dermatology, Istituto S. Maria e S. Gallicano, Via S. Gallicano 25, Rome, Italy). *Br. J. Dermatol.* 97(6): 617-627; 1977.

In an effort to establish the existence of a hereditary form of porphyria cutanea tarda (PCT), PCT is described as a common feature in several members of one family, and clinical and chemical criteria for distinguishing PCT from porphyria variegata (PV) are presented. Fourteen patients from five families (2, 2, 2, 3, and 5 per family, resp.) were found among 200 patients with PCT; in the latter family, the inheritance of PCT appears bilateral. All patients showed a constant increase in serum porphyrin level, a urinary excretion of δ-aminolevulinic acid (δ ALA) in the normal range, a marked increase in urinary porphyrins (with a prevalence of 8- and 7-COOH porphyrins), a normal excretion of coproporphyrins and protoporphyrins, and normal values

for porphyrin in the erythrocytes and for porphobilinogen in the urine. Thus, to distinguish PCT from PV, hepatic coproporphyria, or hepatoerythrocytic porphyria, determinations of total urinary porphyrins, the pattern of urinary porphyrins, fecal porphyrins (in patients with high porphyrin excretion and/or a prevalence of uroporphyrins or of 7-COOH porphyrins), δ ALA, and porphobilinogen must be carried out. This analysis should be extended to blood relatives, even in the absence of symptoms, to prove hereditary PCT. The metabolic defect appears to be inherited as an autosomal dominant trait and may have a low penetrance, mild expressivity, or require an exogeneous acquired factor (infective or toxic) capable of damaging the liver before the appearance of clinical manifestations.

4832 BANNED AND PERMITTED DRUGS IN ACUTE HEPATIC PORPHYRIA. (Ger.) Doss, M.; Wetterberg, L. (Fach Klinische Biochemie im FB Humanmedizin der Universitat, Pilgrimstein 2, D-3550 Marburg/Lahn, W. Germany). *Fortschr. Med.* 95(42):2531-2533; 2536; 1977.

The drugs that are permitted and banned in acute hepatic porphyria (acute intermittent porphyria, porphyria variegata, and hereditary coproporphyria) in various countries (Australia, Bulgaria, Denmark, Finland, France, Great Britain, Norway, Poland, South Africa, Sweden, Switzerland, United States, and West Germany) are listed. Chlorpromazine, penicillin, chloralhydrate, morphine, neostigmin, propranolol, ether, tetracycline, acetylsalicylic acid, atropine, guanethidine, laughing gas, succinyl dicholine, corticosteroids, rifamycin, dicoumarol, dexamethasone, droperidol, mefenamic acid, pethidine, phenatanyl, propoxyphene, and reserpine are each permitted in at least one country. Althesin, barbiturates, bemegrid, carbromal, chloramphenicol, chlorodiazepoxide, chloropropamide, diazepam, ergotamine preparations, fern extracts, gluthetimide, griseofulvin, halothane, hydantoin, imipramine, ketamines, meprobamate, mesuccimide, methyldopa, methypyrylone, nikethamide, estrogens, oral contraceptives, pentazocin, phensuximide, phenylbutazone, pyrazine amide, pyrazolone derivatives, steroids, sulfonamides, theophyllin derivatives, tolbutamide, troxidone, heavy metals, alcohol, and low-calorie diet are banned because of associated clinical manifestations. Acetylsalicylic acid, methadone, pethidine, morphine and its derivatives, chloralhydrate, paraldehyde, chloropromazine, reserpine, propranolol, valerian tincture, neostigmine, B vitamins, calcibromate, calcium gluconate, corticosteroids, and cytochrome C are permitted, while pyrazolone derivatives, phenylbutazone, barbiturates, glutethimide, methypyrylone, meprobamate, diazepine, sulfonamides, griseofulvin, chloramphenicol, tetracyclin, oral antidiabetics, anticoagulants, hydantoin, ergotamine, estrogens, progesterone, and oral contraceptives are banned in acute intermittent porphyria.

4833 CLINICAL, HUMORAL AND HISTOLOGICAL FINDINGS IN HEPATIC PORPHYRIA. (Ger.) Morl, M.; Hauenstein, K. H. (Medizinische Klinik und Poliklinik der Universitat, Krankenhausstr. 12, D-8250 Erlangen, W. Germany). *Munch. Med. Wochenschr.* 119(45):1457-1458; 1977.

The clinical, humoral, and histological findings in 25 patients with porphyria cutanea tarda (PCT) and in 4 patients with acute intermittent porphyria (AIP) are presented. The serum iron level was normal in all patients with AIP and the total lipid level was slightly increased at a normal triglyceride level in three of four patients. The total cholesterol level was increased in one case. Diabetic metabolism was found in two patients. Among the patients with PCT, fatty degeneration of the hepatocytes was seen in 17 cases, liver fibrosis in 4, liver cirrhosis in 5, chronic hepatitis in 4, epithelial cell and astrocyte siderosis in 13, and mesenchymal reaction in 19. The serum iron level was increased in two-thirds of the patients, the BSP test was pathological in 23/25, increased serum uric acid level was found in 11/25, increased total lipid level in 17/25, and 7/25 had manifest diabetes mellitus, while 4 others had subclinical diabetes mellitus.

4834 LARGE INTRAHEPATIC CYSTS AND PSEUDOCYSTS: PITFALLS IN DIAGNOSIS AND TREATMENT. (Eng.) Wellwood, J. M.; Madara, J. L.; Cady, B.; Haggitt, R. C. (St. Bartholomew's Hosp., West Smithfield, London, EC1, England). *Am. J. Surg.* 135(1): 54-64; 1978.

The records of 47 patients with large intrahepatic cysts or pseudocysts were analyzed, and the nature, diagnosis, and treatment of these cysts are described. Thirty-one cysts were developmental, and 16 were acquired. Patients with developmental cysts and those with neoplastic cysts had similar features, including an absence of constitutional illness, but patients with infective pseudocysts generally had features of systemic disease and often had hematologic abnormalities. Sonography indicated the cystic nature of the lesions, but operation was usually necessary to establish a precise diagnosis. Four of the solitary giant cysts were successfully treated by subtotal excision, a less extensive procedure than hepatic resection or total excision of the cyst. Recurrences were common after lesser procedures. The nature of two malignant cysts was not recognized at operation, and cysts with macroscopic features of neoplasia should be treated by hepatic resection even when frozen section biopsy fails to support such a diagnosis. Pyogenic pseudocysts were treated adequately by drainage, but echinococcal cysts required injection with hypertonic saline or Formalin and partial or complete excision for cure. Traumatic pseudocysts healed only when bleeding or bile leakage into the cyst cavity was controlled.

4835 HEPATIC FAILURE AND DEATH FROM ERYTHROPOIETIC PROTOPORPHYRIA. (Eng.) Singer, J. A.; Plaut, A. G.; Kaplan, M. M. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Gastroenterology* 74(3):588-591; 1978.

The case of a 60-yr-old white man presenting with a clinical picture of obstructive jaundice, who was subsequently found to have erythropoietic protoporphyria, is described. The diagnosis was suspected because of a history of life-long photosensitivity and was confirmed by finding high levels of RBC protoporphyrin. Liver biopsy revealed birefringent deposits of protoporphyrin by polarization microscopy accompanied by severe hepatic injury and fibrosis. The patient died rapidly from liver failure, and at autopsy the biliary tree was patent. Despite the autosomal dominant transmission of erythropoietic protoporphyria, no family members with the disease were found.

4836 THE PATTERN OF THE WHOLE BODY DISTRIBUTION OF RADIOACTIVE COPPER (^{67}Cu, ^{64}Cu) IN WILSON'S DISEASE AND VARIOUS CONTROL GROUPS. (Eng.) Walshe, J. M.; Potter, G. (Cambridge Univ. Clinical Sch., Cambridge, England). *Q. J. Med.* 46 (184):445-462; 1977.

A new technique for studying the distribution and uptake of injected radioactive copper, using a whole-body monitor modified to act as a profile scanner, is described. ^{64}Cu and ^{67}Cu were injected i.v. and used to study abnormalities of copper transport in patients with Wilson's disease in the presymptomatic (8 patients), symptomatic (14), and treated phases (14) of the disease. The findings were compared with data obtained from 10 individuals heterozygous for the Wilson's disease gene and from a control group consisting of 13 patients of similar age with a variety of diseases of the motor nervous system. The measurements made included plasma levels of radioactive copper, liver uptake, and whole-body distribution measured both by profile scanning and whole-body scintiscanning. Results from the various techniques were in good agreement. They confirmed earlier findings that, in presymptomatic Wilson's disease, the uptake of copper by the liver is significantly greater than in controls, and rises continuously. Heterozygotes took up an intermediate position between the two groups. Disappearance of copper from plasma roughly corresponded to the sequestration of the metal by liver. Untreated, symptomatic Wilson's disease patients showed much delayed copper uptake by the liver and slow plasma clearance. Treatment with chelating agents restored the pattern towards that seen in presymptomatic patients. A feature of the profile scan and the scintiscans in the controls was the appearance of copper in the gut at or soon after 48 hr, a feature that has not been seen in heterozygotes and presymptomatic patients. The shape of the profile scan in the heterozygotes was more akin to that seen in presymptomatic Wilson's disease than in controls, and this observation increases the possibility of diagnosing the carrier state with greater precision than was previously possible.

4837 ATYPICAL MANIFESTATION OF WILSON'S DISEASE IN CHILDHOOD. (Ger.) Feist, D.; Schmid-Ruter, E.; Wesch, H. (Universitats-Kinderklinik, Im Neuenheimer Feld 150, 6900 Heidelberg 1, W. Germany). *Therapiewoche* 27(39):6743-6746, *passim*; 1977.

The observation of atypical manifestations of Wilson's disease in four children (aged 9.9-15 yr) is reported. Jaundice, hematemesis, and hepatic coma were the first symptoms in two patients, recurrent epistaxis and hematemesis in one, and recurrent epistaxis and splenomegaly in another. Two patients died from hemorrhage, and the other two have been asymptomatic under D-penicillamine treatment for 2.5 and 4.5 yr, resp. Two patients were examined for Kayser-Fleischer rings, which were found in one of them. Wilson's disease was diagnosed on the basis of increased liver copper level (535-1,250 µg/g). The ceruloplasmin level, determined in two patients, was 10.9 mg% and 18.2 mg%, resp. The urine copper level was also increased following D-penicillamine treatment. The findings indicate that Wilson's disease should be considered in any acute or chronic hepatopathy of unknown genesis or atypical course, or in hepatomegaly, splenomegaly, and hemolytic crises in school-age children. Normal serum levels of ceruloplasmin and copper do not rule out Wilson's disease. The serum copper may even be increased during acute crises. The determination of the copper content in the 24-hr urine before and after 3-day treatment with D-penicillamine (0.9-1.2 g) and in liver biopsy specimens is necessary for the diagnosis of Wilson's disease with atypical manifestations.

4838 PROGNOSIS OF WILSON'S DISEASE IN CHILDHOOD. (Eng.) Arima, M.; Takeshita, K.; Yoshino, K.; Kitahara, T.; Suzuki, Y. (Tottori Univ. Sch. Medicine, Yonago, Japan). *Eur. J. Pediatr.* 126(3):147-154; 1977.

The prognosis of Wilson's disease was studied in 49 children under the age of 15 with this disease. The patients were treated with D-penicillamine for 2 to 15 yr. None of the presymptomatic patients subsequently developed any symptoms of the disease. The results of treatment in the 13 patients who had exhibited only hepatic symptoms were also excellent. However, neurological manifestations associated with a history of jaundice or ascites in 26 patients responded less well to chelation. These observations clearly indicate that early diagnosis and treatment are extremely important to ensure normal lives for children with Wilson's disease.

4839 ABSOLUTE CONFIGURATION OF PENTAHYDROXY BILE ALCOHOLS EXCRETED BY PATIENTS WITH CEREBROTENDINOUS XANTHOMATOSIS: A CIRCULAR DICHROISM STUDY. (Eng.) Dayal, B.; Salen, G.; Tint, G. S.; Toome, V.; Shefer, S.; Mosbach, E. H. (New Jersey Medical Sch., Newark, NJ 07103). *J. Lipid Res.* 19(2):187-190; 1978.

Circular dichroism (CD) spectroscopy was used to determine the absolute configurations of the C_{27} pentahydroxy bile alcohols present in bile and feces of two patients with cerebrotendinous xanthomatosis (CTX). The CD spectra of 5β-chol-

estane-3α,7α,12α,24α,25-pentol in the presence of Eu(fod)$_3$ (tris[1,1,1,2,2,3,3-heptafluoro-7,7-dimethyloctane-4,6-dionato] europium [III]) exhibited a negative Cotton effect and was assigned the 24*R* absolute configuration. Conversely, 5ß-cholestane-3α,7α,12α,24ß,25-pentol showed a strong positive Cotton effect and was assigned the 24*S* configuration. These assignments were based upon comparison with a model compound, 5-cholestene-3ß,24(*R*),25-triol, whose single-crystal x-ray structure has been determined. The importance of these data is to establish a structural mechanism for the conversion of 5ß-cholestane-3α,7α,12α,24*S*,25-pentol rather than 5ß-cholestane-3α,7α,12α,24*R*,25-pentol into cholic acid in man as well as in animals.

4840 CHOLYL-L^{14}C GLYCINE CLEARANCE AND SERUM BILE ACID CONCENTRATION FOR THE DETECTION OF LIVER DYSFUNCTION [Abstract]. (Eng.) Thjodleifsson, B.; Barnes, S.; Chitranukroh, A.; Billing, B. H.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Digestion* 14(5/6):553-554; 1976.

4841 PROLYL HYDROXYLASE ACTIVITY IN LIVER BIOPSY SPECIMENS. AN INDICATOR FOR THE ACTIVITY OF CONNECTIVE TISSUE FORMATION [Abstract]? (Eng.) Brunner, G.; Schubothe, M. (Dept. Gastroenterology and Metabolic Diseases, Univ. Gottingen, Gottingen, W. Germany). *Digestion* 14(5/6):463; 1976.

4842 THE CORRELATION BETWEEN THE SPLEEN DELINEATION ON LIVER SCINTIGRAM AND LIVER FUNCTION TEST. (Eng.) Furukawa, M. (Kurume Univ. Sch. Medicine, Kurume 830, Japan). *Kurume Med. J.* 23(2):97-104; 1976.

4843 LIVER DISEASE IN EARLY LIFE IN KENYA. (Eng.) Bowry, T. S.; Cameron, H. M. (Dept. Pathology, Univ. Nairobi, Nairobi, Kenya). *Trans. R. Soc. Trop. Med. Hyg.* 70(5/6):439-443; 1976.

4844 CAN SEVERE CHRONIC ACTIVE LIVER DISEASE (CALD) TREATED WITH STEROIDS BE CURED [Abstract]? (Eng.) Czaja, A. J.; Summerskill, W. H. J. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1042; 1977.

4845 LIVER DISEASE IN INFANTS. PART I: DEVELOPMENTAL HEPATOLOGY AND MECHANISMS OF LIVER DYSFUNCTION. (Eng.) Andres, J. M.; Mathis, R. K.; Walker, W. A. (Massachusetts General Hosp., Boston, MA 02114). *J. Pediatr.* 90(5):686-697; 1977.

4846 DYNAMICS OF LIPID, CARBOHYDRATE, MAGNESIUM AND PROTEIN DISTURBANCES IN LIVER DISEASES. (Pol.) Skarbek-Galamon, C.; Durasiewicz, Z. (ul. Rewolucji 1905 r. 76 m 1. 90-223, Lodz, Poland). *Wiad. Lek.* 29(22):1985-1993; 1976.

4847 DISTRIBUTION PATTERNS OF PROCOLLAGEN I AND III IN LIVER DISEASE [Abstract]. (Eng.) Penner, E.; Brunner, H.; Wick, G. (Dept. Gastroenterology, Univ. Vienna, Vienna, Austria). *Gastroenterology* 72(5, Part 2):1112; 1977.

4848 VALUE OF DIALYSIS IN THE TREATMENT OF RENAL FAILURE IN PATIENTS WITH LIVER DISEASE [Abstract]. (Eng.) Weston, M. J.; Wilkinson, S. P.; Parsons, V.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):555; 1976.

4849 HYPERGLOBULINEMIA AND VIRAL ANTIBODIES IN LIVER DISEASE. (Eng.) Wright, R. (Royal South Hants Hosp., Southampton SO9 4PE, England). *Minerva Gastroenterol.* 22(3):181-183; 1976.

4850 HEPATIC CHOLESTEROL ESTER HYDROLASE IN HUMAN LIVER DISEASE [Abstract]. (Eng.) Simon, J. B.; Poon, R. W. M. (Dept. Medicine, Queen's Univ., Kingston, Ontario, Canada). *Clin. Res.* 24(5):667A; 1976.

4851 THE DISEASE SPECIFICITY OF A LIVER-MEMBRANE AUTOANTIBODY [Abstract]. (Eng.) Tage-Jensen, U.; Arnold, W.; Dietrichson, O.; Hardt, F.; Hopf, U.; Meyer zum Buschenfelde, K. H.; Nielsen, J. O. (Kommunehospitalet, Copenhagen, Denmark). *Digestion* 14(5/6):553; 1976.

4852 AMOEBIC LIVER ABSCESS IN RHODESIAN AFRICANS. (Eng.) Lamont, A. C.; Wicks, A. C. B. (Harari Hosp., Salisbury, Rhodesia). *Trans. R. Soc. Trop. Med. Hyg.* 70(4):302-305; 1976.

4853 PHENOBARBITAL THERAPY IN INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS IN ADULTS. A RANDOMIZED TRIAL [Abstract]. (Eng.) Metreau, J. M.; Lecompte, Y.; Arondel, J.; Dhumeaux, D. (Hopital Henri-Mondor, Creteil, France). *Digestion* 14(5/6):471-472; 1976.

4854 ROLE OF RENAL TUBULAR REABSORPTION OF BILE ACIDS IN CHOLESTASIS [Abstract]. (Eng.) Barnes, S.; Gollan, J.; Billing, B. H. (Royal Free Hosp., Hampstead, London, England). *Digestion* 14(5/6):474; 1976.

4855 POOL SIZE, SYNTHESIS, AND TURNOVER OF SULFATED AND NONSULFATED BILE ACIDS IN PATIENTS WITH CHOLESTASIS [Abstract]. (Eng.) Stiehl, A.; Raedsch, R.; Ast, E.; Czygan, P.; Frohling, W.; Kommerell, B. (Medizinische Universitatsklinik, Univ. Heidelberg, Heidelberg, W. Germany). *Digestion* 14(5/6):462; 1976.

4856 A METABOLIC EVALUATION OF HEPATIC COMA AND RECOVERY [Abstract]. (Eng.) Hutson,

D. G.; Dombro, R.; Zeppa, R.; Ono, J.; Levi, J. U. (Univ. Miami Sch. Medicine, Miami, FL 33152). *Gastroenterology* 72(5, Part 2):1175; 1977.

4857 PLASMAPHERESIS IN A PATIENT WITH FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Horak, W.; Renner, F.; Grabner, G. (Ordinariat fur Gastroenterologie der Universitat Wien, Vienna, Austria). *Digestion* 14(5/6):519; 1976.

4858 EFFECT OF THE NEW RHONE-POULENC POLYACRYLONITRILE MEMBRANE ON PLASMA AMINO ACID LEVELS AND DEPTH OF COMA IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Silk, D. B. A.; Chase, R. A.; Trewby, P. N.; Weston, M. J.; Wheeler, P.; Hanid, A.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):550; 1976.

4859 ACUTE LIVER FAILURE. (Eng.) Knell, A. J. (Warwick General Hosp., Lakin Rd., Warwick, England). *Practitioner* 218(1304):230-237; 1977.

4860 BILE LIPID COMPOSITION AND BILE ACID POOL SIZE IN DIABETES [Abstract]. (Eng.) Ponz de Leon, M.; Carulli, N. (Istituto di Clinica Medica, Universita di Modena, Modena, Italy). *Digestion* 14(5/6):461; 1976.

4861 HYPERALIMENTATION IN FACE OF HEPATIC INSUFFICIENCY: A NEW APPROACH [Abstract]. (Eng.) Fischer, J. E.; Aguirre, A.; Funovics, J. M.; James, J. H.; Keane, J.; Wesdorp, I. C.; *et al.* (Massachusetts General Hosp., Boston, MA). *Acta Chir. Scand.* (Suppl. 466):104; 1976.

4862 HEPATITIS B SURFACE ANTIGENAEMIA IN KENYANS WITH CHRONIC LIVER DISEASE. (Eng.) Pettigrew, N. M.; Bagshawe, A. F.; Cameron, H. M.; Cameron, C. H.; Dorman, J. M.; MacSween, R. N. M. (Dept. Pathology, Univ. Nairobi, Nairobi, Kenya). *Trans. R. Soc. Trop. Med. Hyg.* 70(5/6): 462-465; 1976.

4863 HEPATITIS B VIRUS INFECTION AND PRIMARY HEPATOCELLULAR CARCINOMA [Abstract]. (Eng.) Tabor, E.; Gerety, R. J.; Vogel, C. L.; Bayley, A.; Anthony, P.; Barker, L. F. (Bureau Biologics, Food and Drug Admin., Bethesda, MD). *Digestion* 14(5/6):552-553; 1976.

4864 ACQUIRED DYSFIBRINOGENAEMIA IN LIVER DISEASE [Abstract]. (Eng.) Woolf, I. L.; Lane, D. A.; Scully, M. F.; Thomas, D. P.; Kakkar, V. V.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):556; 1976.

4865 PELIOSIS HEPATIS IN RENAL TRANSPLANT RECIPIENTS [Abstract]. (Eng.) Degott, C.; Potet, F.; Feldmann, G.; Rueff, B.; Benhamou, J. P. (Hopital Beaujon, Clichy, France). *Digestion* 14(5/6):467-468; 1976.

4866 GANGRENE OF THE HEPATIC ROUND LIGAMENT CAUSING DIFFUSE PERITONITIS: A CASE REPORT. (Eng.) Charuzi, I.; Freund, H. (Hadassah Univ. Hosp., Jerusalem, Israel). *Am. Surg.* 42(12): 925-926; 1976.

4867 INFECTIONS COMPLICATING ORTHOTOPIC LIVER TRANSPLANTATION. A STUDY EMPHASIZING GRAFT-RELATED SEPTICEMIA. (Eng.) Schroter, G. P. J.; Hoelscher, M.; Putnam, C. W.; Porter, K. A.; Hansbrough, J. F.; Starzl, T. E. (Univ. Colorado Medical Center, 4200 E. Ninth Ave., Denver, CO 80220). *Arch. Surg.* 111(12):1337-1347; 1976.

See also, 4423, 4438, 4534, 4558, 4559, 4560, 4567, 4568, 4569, 4588, 4592, 4600, 4602, 4614, 4647, 4719, 4773, 4777, 4805, 4871, 4887, 4890, 4904, 4906, 4923, 4932, 4935, 4942, 4951, 4981, 5032, 5037, 5042, 5043, 5049.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

4868 EFFECT OF PHOTOTHERAPY IN NITROGEN AND ELECTROLYTE LEVELS AND WATER BALANCE IN JAUNDICED PRETERM INFANTS. (Eng.) Wu, P. Y. K.; Moosa, A. (Women's Hosp., 1240 North Mission Rd., Los Angeles, CA 90033). *Pediatrics* 61(2):193-198; 1978.

To assess the pattern of water, electrolyte, and nitrogen retention and excretion after phototherapy, 24-hr metabolic balance studies were performed in 10 jaundiced preterm infants, 5 given phototherapy, and 5 controls. Each of the light-treated infants was studied twice, once during phototherapy (period I) and once 48 hr after phototherapy (period II). Control infants were similarly studied during the corresponding days. Compared to period II and control infants, during period I, the light-treated infants had less weight gain (1.8 ± 1.7 g/kg) than

they did in period II (28.6 ± 3.4 g/kg) or than did the controls in periods I and II (17.8 ± 4.6 and 29.4 ± 3.5 g/kg, resp.). These differences were highly significant ($p<0.000$). Additionally, in the light-treated infants in period I, intestinal transit time was decreased by 50% ($p<0.000$); fecal excretion of nitrogen, sodium, and potassium was increased ($p<0.01$); stool water loss was increased twofold to threefold ($p<0.01$) with a decrease in water balance ($p<0.05$); and unmeasured water loss was increased ($p<0.01$). These studies underscore the need for careful attention to fluid and caloric supplementation during phototherapy.

4869 D-PENICILLAMINE TREATMENT OF PREMATURE BABIES WITH HYPERBILIRUBINEMIA. (Hun.) Koranyi, G.; Kovacs, J.; Voros, I. (Csecsemo es Gyermekosztaly, Fov. Peterfy Sandor utcai Korhaz-Rendelointezet, Budapest, Hungary). *Orv. Hetil.* 119(3):149-153; 1978.

4870 CONTINUOUS AND INTERMITTENT PHOTOTHERAPY IN THE PROPHYLAXIS OF HYPERBILIRUBINEMIA IN UNDERWEIGHT NEONATES. (Ita.) Romagnoli, C.; Polidori, G.; Cataldi, L.; De Turris, P. (Istituto di Clinica Pediatrica, Universita Cattolica del Sacro Cuore, Rome, Italy). *Minerva Pediatr.* 29(11): 805-808; 1977.

4871 NEONATAL JAUNDICE AND BILIARY ATRESIA. (Eng.) de Lorimier, A. A. (Univ. California, Sch. Medicine, San Francisco, CA 94143). *Surg. Clin. North Am.* 57(2):429-441; 1977.

See also, 4460, 4824.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

4872 IMMUNOLOGIC REACTIVITY OF PATIENTS WITH TOXIC HEPATITIS. (Rus.) Kleiner, A. I.; Getmanets, I. Ia.; Smolianinova, N. S.; Krylova, E. V.; Rezenkina, L. D.; Galas', G. S. (Inst. Vocational Hygiene and Occupational Diseases, Kharkov, USSR). *Gig. Tr. Prof. Zabol.* (7):15-18; 1977.

The state of immunologic reactivity was studied in 48 women with toluene derivative-induced toxic hepatitis. Clinical manifestations of the disease included abdominal pain, dyspepsia, and liver enlargement. The patients with toxic hepatitis had a marked increase of IgG content (986 mg%, compared to 881 mg% in healthy controls), a mild increase of IgA content (384 mg% versus 288 mg%) and significantly decreased lysozyme titer (34.4 ± 3.8 versus 61.6 ± 0.7, $p<0.001$). The direct hemagglutination reaction showed that 40% of the patients had antibodies against liver antigens, 48% had antibodies against pancreatic antigens, 41% had antibodies against stomach antigens, 11% had antibodies against heart antigens, 5% had antibodies against spleen antigens, and 4% had antibodies against kidney antigens.

4873 NITROFURANTOIN-INDUCED GRANULOMATOUS HEPATITIS. (Ger.) Strohscheer, H.; Wegener, H. H. (II. Med. Klinik, Rudolf-Virchow-Krankenhaus, Augustenburger Platz 1, D-1000 Berlin 65, W. Germany). *Munch. Med. Wochenschr.* 119(47):1535-1536; 1977.

Two women, aged 58 and 59 yr, developed clinically diagnosed granulomatous hepatitis, confirmed through biopsy, during nitrofurantoin treatment. Slight increase of the serum transaminase and alkaline phosphatase activities and marked increase in the serum alpha-2 globulins and IgG levels were seen. The examination of liver biopsy specimens revealed multiple granulomas measuring 150-350 μm in diameter, focal parenchymal necrosis, granulomatous proliferation of mesenchymal cells, marked eosinophil granulocyte infiltration, and polynuclear giant cells. Unlike hepatic changes simulating chronic hepatitis and toxic liver damage due to nitrofurantoin, there is no other known case of granulomatous hepatitis due to nitrofurantoin.

4874 ACUTE NECROSIS OF THE LIVER AFTER TREATMENT WITH OPIPRAMOL. (Dut.) van Vliet, A. C. M.; Frenkel, M.; Wilson, J. H. P. (Afdeling Inwendige Geneeskunde, Academisch Ziekenhuis Rotterdam-Dijkzigt, Rotterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(34):1325-1327; 1977.

A 24-yr-old woman developed acute liver necrosis following a 10-day treatment with the tricyclic antidepressant opipramol (Insidon; 2 x 50 mg/day, p.o.). She died from liver necrosis and its complications 11 days later. In the absence of toxoplasmosis, viral hepatitis, or alcohol use, a

causal connection between opipramol and the hepatopathy is considered probable.

4875 DIHYDRAZINE-INDUCED ACUTE HEPATITIS IN IgM DEFICIENCY. (Ger.) Knoblauch, M.; Cueni, B.; Spycher, M.; Schmid, M. (Medizinische Universitatsklinik, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(19):651-656; 1977.

See also, 4804, 4812, 4814, 4827, 4864.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

4876 ACUTE HEPATITIS IN CHILDHOOD. (Ger.) Franzen, C.; Brodersen, M. (Universitats-Kinderklinik, Josef-Schneider-Strasse, 8700 Wurzburg, W. Germany). *Therapiewoche* 27(39):6734, 6737, 6738, 6740; 1977.

An epidemiological analysis of 146 children (67 boys, 79 girls) with acute hepatitis that occurred during the 1968-1975 period in the Wurzburg area is presented. Nine boys and 14 girls had hepatitis B; 58 boys and 65 girls had non-B hepatitis. Eight of the 23 patients with hepatitis B acquired the hepatitis in the hospital due to surgery or blood transfusion, 1 acquired it in the family, 3 in children's homes, 1 during travel in Mediterranean countries, and 1 after moving to another area. The source of the infection could not be established in nine cases. Thirty-nine of the 123 HBsAg-negative patients acquired hepatitis during epidemics (16 in the family, 7 in children's homes, and 16 in kindergarten, school, or neighborhood), 12 acquired it during travel in Mediterranean countries or after moving to another area, and 39 during small-scale epidemics. The source was not established in 33 cases. Unlike the situation in the children, hepatitis B was dominant in the adult population during the same period in the same geographic region.

4877 STUDY OF CAUSES OF HIGH CASE FATALITY AND OF OUTCOME OF PREGNANCY IN VIRAL HEPATITIS. (Eng.) Puvacic, Z.; Gaon, J.; Bryan, J.; Kendrick, M. (Medical Center, Travnik, Yugoslavia). *Acta Med. Iugosl.* 31(4):305-320; 1977.

Mortality rates among pregnant women suffering from icteric viral hepatitis (749 cases with type A, 73 with type B, 23 with type undetermined) were examined for the period 1964-1974 in Bosnia-Herzegovina, Yugoslavia, and the effects of hepatitis infection on spontaneous abortions, premature deliveries, stillbirths, and time of birth of abnormal infants were analyzed. Of the 845 women, 585 were investigated retrospectively and 260 prospectively. The mortality rate was analyzed according to nationality, age, geographic area, degree of physical effort during pregnancy, and type of diet. Of the 664 Moslem women investigated, 113 died during pregnancy, while only 6 of the 181 non-Moslem women died at this time ($p<0.001$). There was a significant difference ($p<0.0027$) between the case fatality of rural (114/725) and urban (5/120) residents. The high mortality rate among Moslem women was not related to ethnic factors but rather to poorer social and economic conditions. More women with hepatitis died during the third trimester of pregnancy than during the other two trimesters combined (20.83% versus 2.44% and 6.00% for the 1st and 2nd trimesters, resp.). The time of delivery presented a serious risk to life; 48 died at partus prematurus and 37 at partus maturus. Two prominent causes of the high mortality rate ($p<0.001$) were poor diet, with regard to both quantity and quality, and hard physical labor during pregnancy ($p<0.001$). The number of premature deliveries, stillbirths, and normal and abnormal full-term babies did not differ significantly in the pregnant women with hepatitis and in the healthy controls. Hepatitis virus does not present any teratogenic risk with regard to full-term babies.

4878 HEPATITIS B INFECTION IN PHYSICIANS: RESULTS OF A NATIONWIDE SEROEPIDEMIOLOGIC SURVEY. (Eng.) Denes, A. E.; Smith, J. L.; Maynard, J. E.; Doto, I. L.; Berquist, K. R.; Finkel, A. J. (Center for Disease Control, U.S. Public Health Service, U.S. Dept. Health, Education and Welfare, Phoenix, AZ). *JAMA* 239(3):210-212; 1978.

A seroepidemiologic survey of physicians attending three American Medical Association conventions in 1975 and 1976 was conducted to define the epidemiologic features of occupationally acquired hepatitis B infection. Of 1,192 participating physicians, 18.5% had serologic evidence of prior hepatitis B virus infection (positive hepatitis B surface antibody). The infection rate was higher among those practicing in urban communities (27.2%) than in smaller communities (15.6%, $p<0.001$); it increased with the number of years in practice;

and among specialties, it was highest in pathologists (27%) and surgeons (28%). The serologic data demonstrated a changing pattern of viral hepatitis related to entry into the medical profession, with hepatitis B accounting for a majority of clinical hepatitis experienced after beginning medical practice.

4879 NATURAL HISTORY OF ACUTE HEPATITIS B IN PREVIOUSLY HEALTHY PATIENTS: A PROSPECTIVE STUDY. (Eng.) Niermeijer, P.; Gips, C. H. (Majella Hosp., Bussum, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):317-325; 1977.

To relate the time of onset of first symptoms and signs and of biochemical disturbances in acute hepatitis B to well-defined disease stages, the natural history of acute hepatitis B was studied in 38 patients. Fatigue began a median of 4 weeks, abdominal symptoms a median of 3 weeks, and signs of cholestasis a median of 2.5 weeks before peak SGPT values were reached. Extrahepatic manifestations occurred throughout the prodromal stage, and the presence of arthropathy, urticaria, or skin rashes was not related to the biochemical severity of the liver disease. The higher the maximal values of serum bilirubin and/or the older the patient, the longer the period of bilirubin elevation; a maximal bilirubin elevation less than 20 times the upper limit of normal was associated with normalization of serum bilirubin within 6 weeks. No such correlations were found between the levels of SGPT, serum alkaline phosphatase, thymol turbidity, or cholesterol and the subsequent duration of their abnormality. The institution of bedrest before peak SGPT was attained was associated with normalization of SGPT levels within 8 weeks after peak levels were reached. Thirty-seven patients recovered completely. In the remaining patient, hepatitis B surface antigenemia and slight SGPT elevation persisted. In this patient, bedrest was instituted late in the course of the disease. The influence of bedrest therapy on disease outcome remains to be clarified.

4880 IDIOPATHIC GRANULOMATOUS HEPATITIS WITH A PROLONGED COURSE: EFFECT OF CORTICOSTEROID THERAPY. (Eng.) Penchas, S.; Ligumski, M.; Eliakin, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Digestion* 17(1):46-55; 1978.

The effect of corticosteroids on chronic idiopathic granulomatous hepatitis is explored through four case studies (3 men and 1 woman). The diagnoses were established by liver biopsy in three cases and by laparotomy in one. Three of the four patients had symptoms such as fever with chills, a spiking fever of prolonged duration (and unresponsive to antibiotics), weight loss, rapid ESR, and normal WBC count. The fourth patient had severe perihepatitis (disclosed at laparotomy) with symptoms of pain, fever, and myalgia. In all patients there was a twofold elevation of SGOT and alkaline phospatase activities and a prolongation in prothrombin time occurring several weeks after onset of fever. The disease had a chronic course (5 and 10 yr in 2 cases, and 4 and 6 weeks in the other 2 cases) before the beginning of steroid therapy. In all patients, the administration of relatively high doses of prednisone or ACTH resulted in a prompt fall in temperature and marked improvement in the general state. Cessation of prednisone or ACTH therapy was followed by relapse in all cases. The etiology of the disease remains unknown in these patients.

4881 TREATMENT OF ACUTE VIRAL HEPATITIS WITH (+)-CYANIDANOL-3. (Ger.) Pelloni, S.; Berthet, P.; Blum, A. L.; Doelle, W.; Goebell, H.; Kortum, K.; *et al.* (Medizinische Klinik, Stadtspital Triemli, CH-8063 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(49):1859-1861; 1977.

The effectiveness of (+)-cyanidanol-3 (C, 4 x 500 mg/day for 4 weeks) was studied in 51 patients with acute viral hepatitis and compared with the results in 49 patients with acute viral hepatitis treated with placebo in a cooperative double-blind therapeutic trial. Compared with the placebo group, there was a significant improvement in the C-treated group concerning such symptoms as nausea ($p<0.01$), anorexia ($p<0.05$), and pruritus ($p<0.02$). Abdominal discomfort was also alleviated significantly ($p<0.02$) in the HBsAg-positive patients treated with C. The reduction of the serum bilirubin level was twice as fast in the C-treated patients than in the placebo group. Major side-effects were not seen during the treatment or during the 6-month follow-up period. None of the C-treated patients developed recurrences during the first 6 months after treatment.

4882 AN EVALUATION OF URINARY D-GLUCARIC ACID EXCRETION DURING ACUTE HEPATITIS IN MAN. (Eng.) Carrella, M.; D'Arienzo, A.; Manzillo, G.; De Ritis, F. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *Am. J. Dig. Dis.* 23(1):18-22; 1978.

In an effort to clarify the effect of hepatitis on microsomal enzymes, the excretion of urinary D-glucaric acid (D-GA) was determined in 49 patients with acute hepatitis and in 12 controls. A 3.7-fold increase of D-GA was found at an early stage of the disease (37.13 ± 3.08 μmol/24 hr versus 9.91 ± 1.18 μmol/24 hr in controls), when serum transaminases and bilirubin were very high (SGOT, 589 ± 41 IU; SGPT, 954 ± 61 IU; serum bilirubin, 8.41 ± 0.76 mg/100 ml, $p<0.001$). A lower but still significantly elevated D-GA excretion was also found in the recovery phase of hepatitis at a time when both serum transaminases and bilirubin were considerably reduced (SGOT, 89 ± 14 IU; SGPT, 185 ± 30 IU; serum bilirubin, 1.05 ± 0.20 mg/100 ml, $p<0.001$). Urinary glucuronides and free glucuronic acid, measured as total glucuronic acid, were also markedly increased in early hepatitis (1,164 ± 54 mg/24 hr versus 782 ± 84 mg/24 hr in controls), but no correlation was found with D-GA excretion. Phenobarbital treatment (100 mg/day, p.o.) for 5 days, which led to a threefold increase of D-glucaric acid in all 12 normal subjects, did not cause any

further change in the 28 treated patients with early acute hepatitis. While the mechanism of the urinary D-GA increase in hepatitis still remains undefined, the findings support the conclusion that its increase may not reflect an induction of liver microsomal enzymes.

4883 SIGNIFICANCE OF THE DETERMINATION OF GAMMA-GLUTAMYL TRANSPEPTIDASE AND CHANGES OF THE ENZYME ACTIVITY IN ACUTE HEPATITIS. (Hun.) Udvardy, M.; Kulcsar, A.; Munnich, D.; Dalmi, L. (II. Belgyogyaszoti Klinika, Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary). *Orv. Hetil.* 118(40):2397-2398; 1977.

The value of the γ-glutamyltranspeptidase (GTTP) determination was studied in 28 hepatitis B surface antigen (HBsAg)-negative and 18 HBsAg-positive patients with acute hepatitis and in 40 healthy controls. There was no significant difference in the GGTP levels between the HBsAg-positive and -negative patients. The GGTP level was slightly but consistently increased in the patients throughout the 6-week observation period compared with the controls, but the levels decreased in the course of the treatment (from an initial 79-88 mU/ml to 40-58 mU/ml during the 6th week). The GGTP level was increased even after the normalization of the SGOT and SGPT activities, which indicates that the GGTP test is a more sensitive indicator of the progression of the recovery process than are the SGOT and SGPT tests.

4884 MICROBIOLOGICAL AND IMMUNOLOGICAL ASPECTS OF HEPATITIS. (Ger.) Maass, G. (Institut fur Virusdiagnostik am Hyg.-bakt. Landesuntersuchungsamt, von-Stauffenberg-Strasse 36, 4400 Munster, W. Germany). *Therapiewoche* 26(38):5972-5978, 5981; 1976.

Studies on the microbiological and immunological aspects of hepatitis A and B are reviewed. Hepatitis A virus has a size of 27 nm. Its virion probably contains RNA. The virus does not carry hepatitis B surface antigen (HBsAg). The incubation time is usually 25-30 days, and the virus can be detected in the blood and feces 2 weeks before and 1 week after jaundice. Hepatitis B virus, 42 nm in size, contains DNA in its virion. Its incubation time is 60-90 days, and the virus is detectable in the blood for months to years, and occasionally in the feces. It was possible to infect South American marmosets with hepatitis A virus; the animals developed symptoms similar to those of hepatitis in man. The animals acquired specific immunity, and virus particles similar to those found in the feces of patients with hepatitis A were found in the serum during the infection. The virus particles were specifically agglutinated by the serum convalescent hepatitis A patients. Hepatitis B virus caused asymptomatic infection in rhesus monkeys and chimpanzees, but it was not transmissible to marmosets. Type *d* Australia (Au) antigen was found in 189/322 hepatitis patients and type *y* in 85/322. The incidences of type *d* and *y* Au antigen in Au-antigen carriers were 27/31 and 4/31, resp. Antibodies to HBsAg were found in 6.8% of blood donors, in 17.2% of medical personnel, in 15.3% of patients with HBsAg-positive hepatitis, in 30.6% of convalescent HBsAg hepatitis patients, and in 0% of HBsAg carriers.

4885 HEPATITIS A VIRUS INFECTION: NEW INSIGHTS FROM SEROEPIDEMIOLOGIC STUDIES. (Eng.) Dienstag, J. L.; Szmuness, W.; Stevens, C. E.; Purcell, R. H. (Massachusetts General Hosp., Boston, MA 02114). *J. Infect. Dis.* 137(3):328-340; 1978.

Studies suggesting a comprehensive pattern of the epidemiology of type A hepatitis and concerning its natural perpetuation are reviewed. The prevalence of exposure to hepatitis A virus (HAV) increases with increasing age, decreases with increasing socioeconomic class, increases with increasing serologic evidence of prior hepatitis B virus (HBV) exposure but is much more common than HBV exposure, is independent of sex and race, is not affected by immune deficiency or immaturity, and varies in different parts of the world as a function of hygienic, developmental, and unrecognized geographic factors. Transmission of type A hepatitis is enhanced by poor personal hygiene such as that seen in institutions for the mentally retarded. On the other hand, there is no increased exposure to HAV among homosexuals (who have frequent and intimate contact with multiple sexual partners), among hemodialysis patients and staff, or among multiply transfused individuals, all of whom are at significantly increased risk of exposure to HBV. No epidemiologic evidence has confirmed the existence of viremic or intestinal carriers of HAV, and the virus is rarely, if ever, spread by parenteral mechanisms. Finally, HAV appears to play no role in chronic liver disease and a very minor role in fulminant hepatitis; however, HAV is responsible for 20% to 40% of sporadic hepatitis among urban adults.

4886 THE PREVALENCE OF ANTIBODY TO HEPATITIS A ANTIGEN IN VARIOUS PARTS OF THE WORLD: A PILOT STUDY. (Eng.) Szmuness, W.; Dienstag, J. L.; Purcell, R. H.; Stevens, C. E.; Wong, D. C.; Ikram, H.; *et al.* (New York Blood Center, 310 E. 67th St., New York, NY 10021). *Am. J. Epidemiol.* 106(5):392-398; 1977.

Samples from 1,297 blood donors or patients with non-liver diseases from seven countries were surveyed for antibody to hepatitis A antigen (anti-HA) by immune adherence hemagglutination and for antibody to hepatitis B surface antigen (anti-HBs) by radioimmune assay. The age-standardized anti-HA prevalence was 28.7% in Switzerland, 44.7% in the USA, 76.2% in Senegal, 81.1% in Belgium, 88.7% in Taiwan, 95.3% in Israel, and 96.9% in Yugoslavia. Among subjects 18-19 yr of age, only 5-10% of Swiss and Americans had anti-HA, whereas 92-100% of subjects in the same age group from Israel, Yugoslavia, Taiwan, and Senegal had this antibody. A close correlation between anti-HA and anti-HBs prevalence was seen in five countries; however, in Belgium and Israel, anti-HBs rates were low while anti-HA rates were very high. This sur-

vey confirms that hepatitis A virus infections are widespread throughout the world and that their occurrence and age-distribution are determined to a large extent by environmental and socioeconomic conditions. In view of the unrepresentative nature of the population samples surveyed, these findings should be confirmed using other samples.

4887 HEPATIC PATHOLOGIC CONDITION IN ASYMPTOMATIC AUSTRALIA ANTIGEN CARRIERS: A LIGHT MICROSCOPICAL STUDY OF 26 CASES AND A REVIEW OF THE LITERATURE. (Eng.) Shrago, S. S.; Ausländer, M. O.; Gitnick, G. L. (Univ. California at Los Angeles Center for the Health Sciences, Los Angeles, CA 90024). *Arch. Pathol. Lab. Med.* 101(12):648-651; 1977.

Liver histology was studied in 26 Australia antigen carriers who were asymptomatic with normal liver function tests. The carriers are part of a prospective and long-term study designed to analyze the clinical and pathological consequences of persistent, though asymptomatic antigenemia. The liver abnormalities that were indicated on biopsy included 15 specimens with "inflammatory changes" that were characterized by intralobular foci of mononuclear cells and/or portal tract infiltrates. Fifteen specimens demonstrated "ground-glass" cells. Nine specimens showed fatty change and three were normal. These results in conjunction with cases in the literature indicate a narrow and mild spectrum of liver biopsy specimen abnormalities in the asymptomatic carrier with normal liver function tests. Any prognostic inference from this liver biopsy data is premature and clinical follow-up of carriers is advocated.

4888 IMMUNOHISTOCHEMICAL PATTERNS OF HEPATITIS B SURFACE ANTIGEN (HBsAg) IN PATIENTS WITH HEPATITIS, RENAL HOMOGRAFTS RECIPIENTS, AND NORMAL CARRIERS. (Eng.) Camilleri, J. P.; Amat, C.; Chousterman, M.; Petite, J. P.; Duboust, A.; Boddaert, A.; *et al.* (Hopital Broussais, 96, rue Didot, F-75014 Paris, France). *Virchows Arch. [Pathol. Anat.]* 376(4):329-341; 1977.

A series of 180 Bouin-fixed and paraffin embedded liver biopsies from 147 patients was investigated for the presence of hepatitis B surface antigen (HBsAg) by histochemical and indirect immunofluorescence techniques, to determine whether the immune response of the host plays a role in the genesis of the diverse pathological patterns. A comparison between orcein staining and Masson's trichrome preparations for ground-glass hepatocytes showed that immunofluorescence was both the more reliable and the more specific method for detection of HBsAg in liver tissue. The ability to perform this technique on paraffin sections facilitates systematic studies and allows retrospective work-up. HBsAg-positive hepatocytes were found in approximately two-thirds of the sera of all HBsAg-positive patients, but never in HBsAg-negative patients. HBsAg-positive cells were observed in healthy chronic carriers and in all forms of chronic hepatitis, but never in acute HBsAg-positive hepatitis. In chronic hemodialysis and renal transplant patients, 45% were seropositive; HBsAg-positive hepatocytes were found in 34%. The incidence of the antigen was higher in patients followed after transplantation than in those followed during hemodialysis. The results of this study show no relationship between the immunohistochemical pattern and the histological activity of the disease.

4889 IMMUNE RESPONSE TO HEPATITIS B VIRUS IN CHILDREN WITH PAPULAR ACRODERMATITIS. (Eng.) Colombo, M.; Gerber, M. A.; Vernace, S. J.; Gianotti, F.; Paronetto, F. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Gastroenterology* 73(5):1103-1106; 1977.

To study the course of hepatitis B virus infection, 16 patients with childhood papular acrodermatitis (PAC), 2 to 7 yr of age, were followed for periods ranging from 6 to 46 months. All patients tested developed hepatitis B surface antigenemia subtype *ay*, and produced antibody to hepatitis B core antigen (anti-HBc) with the highest incidence after 3 to 5 months. Half of the children investigated developed antibody to hepatitis B surface antigen (anti-HBs) 4 to 18 months (mean, 6.5) after the onset of PAC. At the end of the investigation, 31% of the children were still hepatitis B surface antigen (HBsAg)-positive, 50% were anti-HBc-positive, and in 43% the activity of serum aminotransferases was abnormal. Liver biopsy repeated in two children showed chronic aggressive hepatitis. The pattern of antibody response to hepatitis B virus is similar in both HBsAg-positive hepatitis and PAC. The frequent development of the HBsAg carrier state and the high proportion of children with liver abnormalities at the end of the investigation suggest an impaired clearance of hepatitis B virus and a tendency to chronicity.

4890 ORCEIN STAINING OF HEPATITIS B SURFACE ANTIGEN IN PARAFFIN SECTIONS OF LIVER ON AUTOPSY CASES. (Eng.) Sakurai, M.; Miyaji, T. (Osaka Univ. Medical Sch., 33 Joancho, Nitaku, Osaka, Japan). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):334-339; 1977.

Paraffin sections of 227 liver biopsy specimens taken at autopsy were stained by a modified orcein method, and sera from all cases were tested for hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) to determine if there was a correlation between the presence of orcein-positive hepatocytes and the antigen and/or antibody. HBsAg was tested by an immune adherence hemagglutination method, and anti-HBs was determined by a passive hemagglutination method. Among patients whose sera were HBsAg-positive but anti-HBs-negative, 13 of 19 with cirrhosis and hepatoma, 2 of 3 with cirrhosis without hepatoma, and 2 of 3 with noncirrhotic neoplastic diseases other than hepatoma had orcein-positive hepatocytes. Among patients who were seronegative for both HBsAg and anti-HBs, 4 of 24 with cirrhosis with hepatoma, 2 of 19 with cirrhosis without hepatoma, and 3 of 60 with noncirrhotic neoplastic diseases other than hepatoma had orcein-

positive hepatocytes. Among those who were seronegative for HBsAg but positive for anti-HBs, orcein-positive hepatocytes occurred in 1 of 6 cases of cirrhosis with hepatoma and in 1 of 21 cases of noncirrhotic neoplastic diseases other than hepatoma. Among the patients seropositive for both HBsAg and anti-HBs, orcein-positive cells were found in one of three cases of cirrhosis with hepatoma. No orcein-positive hepatocytes were detected in cases of hepatoma without cirrhosis or in cases of noncirrhotic non-neoplastic diseases in any of the serologic groups.

4891 DETECTION OF HEPATITIS B ANTIGEN IN CIRCULATING IMMUNE COMPLEXES IN ACUTE AND CHRONIC HEPATITIS. (Eng.) Carella, G.; Digeon, M.; Feldmann, G.; Jungers, P.; Drouet, J.; Bach, J. F. (Hopital Necker, 161, rue de Sevres, 75730 Paris, Cedex 15, France). *Scand. J. Immunol.* 6(12): 1297-1304; 1977.

In an effort to learn whether hepatitis B surface antigen (HBsAg) may be found concealed in circulating immune complexes after it has disappeared from the serum, the polyethylene glycol precipitation at low concentration (PEG test) and the radiolabeled complement component Clq binding test were used to detect immune complexes in the sera of patients with acute and chronic hepatitis and HBsAg carriers. Immune complexes were detected in sera from 23 of 28 patients with acute hepatitis, 28 of 32 with chronic hepatitis, 7 of 19 hemodialyzed patients with chronic hepatitis B surface (HBs) antigenemia, and 2 of 11 asymptomatic HBsAg carriers. After treatment of PEG precipitates with acidic pH, heating, or proteolytic enzyme (protease), electroimmunodiffusion or radioimmunoassay revealed the presence of HBsAg or antibody in dissociated immune complexes in sera from several acute and chronic hepatitis patients. Electron microscopy showed immune complexes of hepatitis B virus in 9 of 12 PEG precipitates obtained from PEG test-positive sera; these 9 precipitates were from patients with acute or chronic hepatitis and the other from chronic HBsAg carriers. Free hepatitis B virus particles were observed after protease digestion of PEG precipitates. Neither immune complexes nor virus particles were seen in precipitates from PEG test-negative but HBsAg-positive sera from chronic carriers. This simple test for HBsAg-anti HBs complexes may prove a useful tool in predicting disease outcome and/or for understanding related phenomena.

4892 FREQUENCY OF DETECTION OF HB-ANTIGEN AND ITS SUBTYPES IN THE POPULATION OF DIFFERENT GEOGRAPHICAL ZONES OF THE USSR AND IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Ketiladze, E. S.; Vorozhbieva, T. E. (D. I. Ibanovskii Inst. Virology, Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (9):13-17; 1977.

The incidence of hepatitis B surface antigen (HBsAg) was studied in various populations of the Soviet Union and among high-risk groups. The frequency of HBsAg in the sample of 1805 practically healthy individuals was 2.8% (3.4% in men and 2.2% in women); the frequency of HBsAg was greater in the southern regions of the Soviet Union (8.6% in Georgia, 7.9% in Moldavia, and 5.3% in Middle Asia). The incidence of antigen was markedly greater in a sample of 594 hospitalized tuberculous patients (15.1%) and among personnel of a hemodialysis unit (11.4%). Among 3,032 patients with acute viral hepatitis and 178 patients with chronic hepatitis and cirrhosis, the incidence of HBsAg was 38.6% and 9.6%, resp. The antigen subtype *ay* was observed in 90.6% of the patients with viral hepatitis and in 86.5% of the HBsAg carriers. The incidence of the *ad* subtype was greater among adult patients with viral hepatitis and adult carriers (13.5-28.5%) compared with children (0-3.6%).

4893 PREVALENCE AND EPIDEMIOLOGIC SIGNIFICANCE OF ANTIBODY TO HEPATITIS B CORE ANTIGEN IN GREECE. (Eng.) Papaevangelou, G.; Karaboyia-Karafyllidis, P.; Kyriakidou, A. (52 Skoufa St., Athens 135, Greece). *Am. J. Epidemiol.* 106(6):502-503; 1977.

The diagnostic and epidemiologic significance of antibody to hepatitis B core antigen (anti-HBc) detected by complement fixation was studied in a sample of 412 healthy residents (aged 0-70 yr) of the Athens area. The prevalence of hepatitis B virus (HBV) infections was found to be very high (26.5%), and the hepatitis B surface antigen (HBsAg) carrier rate (4.1%) was among the highest in Europe. Anti-HBc was detected in 63 of the examined persons. In 10 of them, anti-HBc was the only evidence of HBV infection. The prevalence of anti-HBc (without HBsAg or anti-HBs) increased with age, while the HBsAg carrier rate declined in older age groups. The frequency of anti-HBc detection in persons with anti-HBs declined with age, indicating that anti-HBc persists for a shorter period than the anti-HBs after HBV infection. These data stress the importance of anti-HBc testing in increasing the sensitivity of the detection of potentially infective HBV carriers as well as in studying various epidemiologic aspects of HBV infection.

4894 THE DIAGNOSTIC SIGNIFICANCE OF ANTIBODIES AGAINST HEPATITIS B CORE ANTIGEN. (Eng.) Gerlich, W. H.; Biswas, R. M.; Stamm, B.; Thomssen, R. (Hygiene-Institut der Universitat, Kreuzbergring 57, D-3400 Gottingen, W. Germany). *Klin. Wochenschr.* 55(21):1051-1056; 1977.

The frequency of hepatitis B was examined using three serological parameters: hepatitis B surface antigen (HBsAg), antibody to HBsAg (antiHBs), and antibody to hepatitis B core antigen (antiHBc). All three substances were detected qualitatively by radioimmunology. Of 1,216 patients with acute hepatitis, 55% were HBsAg- and antiHBc-positive on admission to hospital. A further 17.8% had no HBsAg but were antiHBc-positive and also partly antiHBs-positive. Among the latter patients, some (8.6% of all patients) had a high antiHBc concentration during the acute phase. Similar anti-HBc concentrations were seldom found (0.04%) in

HBsAg-negative blood donors. AntiHBs in the patients was at first mainly negative and then appeared during reconvalescence. These cases were considered to be acute hepatitis type B, although HBsAg was absent. In the remaining HBsAg-negative, antiHBc-positive patients who were also partly antiHBs-positive, antiHBc was present in low concentrations (9.2% of all patients). In the majority of cases, antiHBs had been present from the beginning. The same antibody constellation was found in 3.6% of 2,341 blood donors. In the group of patients, it is supposed that the acute hepatitis present is not of type B and has a different etiology. The low concentration of antibody is interpreted to be a sign of an earlier hepatitis B virus infection.

4895 PROGNOSTIC IMPLICATIONS OF THE e ANTIGEN OF HEPATITIS B VIRUS. (Eng.) Fay, O.; Tanno, H.; Roncoroni, M.; Edwards, V. M.; Mosley, J. W.; Redeker, A. G. (Faculty Biochemistry, Univ. Rosario, Mitre 1174, 2000 Rosario, Argentina). *JAMA* 238(23):2501-2503; 1977.

The value of the presence or absence of the e antigen (HBeAg) and its antibody (anti-HBe) in predicting the prognosis of hepatitis B infection was studied in 159 patients with acute hepatitis (with early resolution), 18 with acute hepatitis that became chronic, and 129 with chronic hepatitis. The detectability of HBeAg in the acute phase of type B hepatitis was followed by a sixfold higher incidence of chronic hepatitis. Unfortunately, the prediction was erroneous in 65% of positive cases and 6% of negative cases. In chronic hepatitis, HBeAg did not necessarily disappear in advance of resolution, and its disappearance did not necessarily indicate resolution. Two patients with acute hepatitis progressing to chronicity were anti-HBe-positive in both phases, as were seven with chronic hepatitis. For individual patients, therefore, HBeAg and anti-HBe are not prognostically useful indexes.

4896 HEPATITIS B SURFACE ANTIGEN AND e ANTIGEN IN PLEURAL EFFUSION: A CASE REPORT. (Eng.) Tabor, E.; Russell, R. P.; Gerety, R. J.; Barker, L. F.; Hillis, W. D.; Jackson, D. R. (Bureau Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *Gastroenterology* 73(5):1157-1159; 1977.

The case of a 40-yr-old dialysis patient is reported in whom hepatitis B e antigen (HBeAg) and hepatitis B surface antigen (HBsAg) were demonstrated in both pleural fluid and in serum. The titers of HBsAg and HBeAg were similar in serum and pleural fluid, 1:200 and 1:100 in serum and pleural effusion, resp., and 1:2 and 1:1 in serum and pleural effusion, resp. Examination of the pleural fluid by electron microscopy revealed the presence of intact (42 nm) hepatitis B virus particles. These findings underline the potential hepatitis B virus infectivity of other body fluids besides blood, especially for medical and laboratory personnel.

4897 e ANTIGEN AND ANTIBODY, DNA POLYMERASE, AND INHIBITORS OF DNA POLYMERASE IN ACUTE AND CHRONIC HEPATITIS. (Eng.) Cappel, R.; De Cuyper, F.; Van Beers, D. (Institut Pasteur du Brabant, 28 Rue du Remorqueur, 1040 Brussels, Belgium). *J. Infect. Dis.* 136(5):617-622; 1977.

To study new approaches to the evaluation of hepatitis B (HB) infections, the occurrence of HBe antigen (HBeAg) and its antibody (anti-HBe), DNA polymerase, and an inhibitor of this polymerase was investigated in 91 patients with acute hepatitis, 44 with chronic hepatitis, 53 with chronic carriers of the HB surface antigen (HBsAg), and 50 healthy controls. The sensitivities of the radioimmunoassay and the DNA polymerase test in the diagnosis of HB were compared. There was a high correlation between HBeAg and DNA polymerase activity in carriers of HBsAg undergoing hemodialysis as well as in patients with acute hepatitis undergoing hemodialysis but not in nonhemodialyzed acute hepatitis patients. Among patients with chronic hepatitis, 33 had HBsAg and 18 also had DNA polymerase activity; the latter activity was seen more frequently in those with aggressive hepatitis and rarely in those with persistent hepatitis. Additionally, HBeAg was found in 9/30 patients with aggressive hepatitis but in 0/14 with persistent hepatitis ($p<0.01$), confirming the reports that the presence of HBeAg in chronic hepatitis indicates a poor prognosis. Anti-HBe was present in 50% of chronic carriers and patients with persistent hepatitis but in only 6% of the patients with chronic aggressive hepatitis. Hence, only persistent HBe antigenemia and presence of DNA polymerase activity have prognostic value, since they probably reflect viral replication. DNA polymerase activity was present only transiently in acute hepatitis and could be a useful diagnostic tool. Inhibitors of DNA polymerase, which may be antibodies, appeared regularly very early in the course of acute hepatitis, suggesting that they may be associated with viral replication. Their persistence may be of prognostic value since they were found in 62% of patients with chronic aggressive hepatitis but not at all in patients with persistent hepatitis. Since the DNA polymerase test was performed on 20-fold concentrated sera, this test is not more sensitive than the radioimmunoassay but could be helpful in the diagnosis of acute hepatitis in the early stages of the disease.

4898 HEPATITIS B "e" ANTIGEN: AN APPARENT ASSOCIATION WITH LACTATE DEHYDROGENASE ISOZYME-5. (Eng.) Vyas, G. N.; Peterson, D. L.; Townsend, R. M.; Damle, S. R.; Magnius, L. O. (Dept. Lab. Medicine, Univ. California, San Francisco, CA 94143). *Science* 198(4321):1068-1070; 1977.

Sera containing the "e" antigen of hepatitis B virus were subjected to electrophoresis in polyacrylamide gel. An extra band appeared in the lactate dehydrogenase isozyme pattern, but this band was undetectable in sera containing antibodies to the e antigenic determinant. Prior separation of the lactate dehydrogenase isozyme-5 fraction by

chromatography of serum on minicolumns of diethylaminoethyl-Sephadex-A50 improved the electrophoretic identification of the extra band. Neutralization with antibodies to the e antigen as well as by antibodies to the homologous *d* or *y* component of the hepatitis B surface antigen removed the extra band; antibodies to the lactate dehydrogenase isozyme-5 removed both the normal and the extra enzymatic band of isozyme-5. This feature of the e antigen provides a potential assay system for the laboratory diagnosis of hepatitis B and suggests its possible role in pathogenesis of hepatocellular injury.

4899 FAILURE OF HYPERIMMUNE SERUM GLOBULIN, GIVEN SEVERAL DAYS AFTER EXPOSURE, TO PROTECT AGAINST HEPATITIS B [Letter to Editor]. (Eng.) Frosner, G. G.; Frosner, H. R.; Dienhardt, F.; Haussman, W.; Knabi, U. H. (Max-v.-Pettenkofer-Institut, Univ. Munchen, 8000 Munich 2, W. Germany). *Lancet* 2(8046):1023; 1977.

4900 EXPRESSION OF HEPATITIS B VIRUS-SPECIFIC MARKERS IN ASYMPTOMATIC HBsAg CARRIERS [Abstract]. (Eng.) Hess, G.; Arnold, W.; Shih, J. W. K.; Kaplan, P. M.; Purcell, R. H.; Gerin, J. L.; Meyer zum Buschenfelde, K. H. (Klinikum Charlottenburg, Freie Universitat Berlin, Berlin, W. Germany). *Digestion* 16(4):321-322; 1977.

4901 ENZYME-LINKED IMMUNOSORBENT ASSAY FOR DETECTION OF HEPATITIS A ANTIGEN IN STOOL AND ANTIBODY TO HEPATITIS A ANTIGEN IN SERA [Abstract]. (Eng.) Mathiesen, L. R.; Feinstone, S. M.; Skinhoej, P.; Purcell, R. H. (State Serum Inst., Copenhagen, Denmark). *Digestion* 16(4):321; 1977.

4902 DETECTION OF CIRCULATING IMMUNE COMPLEXES (CIC) IN SERA OF PATIENTS WITH ACUTE AND CHRONIC VIRUS HEPATITIS USING THE C1q-DEVIATION METHOD [Abstract]. (Eng.) Sodomann, C. P.; Prokein, K.; Schmidt, H.; Havemann, K. (Clinic Medicine, Univ. Marburg, Marburg a.d. Lahn, W. Germany). *Digestion* 16(4):356; 1977.

4903 RENAL FAILURE AND ELECTROLYTE IMBALANCE IN FULMINANT HEPATITIS AND TERMINAL CIRRHOSIS. A COMPARISON BETWEEN FREQUENCY AND TYPES [Abstract]. (Eng.) Ring-Larsen, H.; Palazzo, U. (Rigshospitalet, Copenhagen, Denmark). *Digestion* 16(4):349; 1977.

4904 THE EFFECT OF SELECTIVE AMINO ACID INFUSIONS ON METABOLIC AND CLINICAL PICTURE OF HEPATIC ENCEPHALOPATHY IN MAN [Abstract]. (Eng.) Ventura, E.; Zeneroli, M. L.; Rocchi, E.; Santunione, V.; Gibertini, P.; Fiaccadori, F.; *et al.* (Dept. Internal Medicine, Univ. Modena, Modena, Italy). *Digestion* 16(4):362; 1977.

See also, 4443, 4803, 4804, 4809, 4810, 4811, 4812, 4818, 4819, 4827, 4841, 4849, 4862, 4863, 4864, 4906, 4915, 4926, 4936.

LIVER AND BILIARY TRACT

Chronic Hepatitis

4905 IN VITRO MORPHOLOGICAL STUDIES ON ANTIBODY-DEPENDENT NONIMMUNE LYMPHOCYTE-MEDIATED CYTOTOXICITY IN CHRONIC ACTIVE LIVER DISEASE. (Eng.) Kawanishi, H. (Ann Arbor Veterans Admin. Hosp., Ann Arbor, MI 48105). *Am. J. Dig. Dis.* 23(2):97-109; 1978.

To investigate the mechanism of parenchymal cell injury or death in chronic active liver disease (CALD), the killing effect of chronic liver disease sera on target Chang cells, mediated by effector nonimmune lymphocytes (NLy), was sudied from 16 (9 with CALD and 6 with chronic persistent hepatitis) patients using an *in vitro* system of antibody-dependent cellular cytotoxicity (ADCC). NLy destroyed Chang cells in monolayers pretreated with sera from nine CALD patients. Sera from these patients after steroid therapy demonstrated a significant decrease of the cytotoxic action of NLy ($p<0.001$) compared with controls. The target cells treated with sera of 10 normal subjects or patients with chronic persistent hepatitis were only minimally affected. Morphological observations of the cytotoxic action in a CALD serum-treated group showed intimate contact between NLy and the target cells in the areas of the plaques, where large numbers of the target Chang cells were injured and were closely associated with effector NLy. The Chang cells developed cytoplasmic swelling. The surface became ruffled, and intracytoplasmic organelles displayed vesicular degeneration. Thereafter, cell rupture and fragmentation occurred. The sera of patients with CALD appear to possess a membrane reactive factor, pre-

sumably antibody, against the surface membrane of Chang cells. This immunological mode of reaction between the effectors and target cells (ADCC) may be important in the perpetuation and pathogenesis of hepatocyte death in CALD.

4906 LYMPHOCYTOTOXICITY TEST AGAINST RABBIT HEPATOCYTES IN CHRONIC LIVER DISEASE. (Eng.) Facchini, A.; Stefanini, G. F.; Bernardi, M.; Miglio, F.; Gasbarrini, G.; Labo, G. (Istituto di I Clinica Medica e Gastroenterologia, Policlinico S. Orsola, Bologna, Italy). *Gut* 19(3):189-193; 1978.

The cytotoxicity against rabbit liver cells of lymphocytes from the peripheral blood of 71 patients with various liver diseases was studied. The 85 patients with chronic active hepatitis and the 3 patients with acute alcoholic hepatitis showed significantly higher mean values of lymphocytotoxicity ($p<0.001$) compared with patients with chronic persistent hepatitis (n=7), postnecrotic fibrosis and cirrhosis (n=11), Wilson's disease (n=8), and prolonged viral hepatitis (n=7). The mean cytotoxicity of these last groups did not differ significantly from those in 44 controls. In four of six patients with chronic active hepatitis, a significant decrease of lymphocytotoxicity was found after immunosuppressive therapy with p.o. prednisolone ($p<0.05$). A good correlation between the lymphocytotoxicity test and histological signs of activity suggests that a cell-mediated immune aggression is present in this disease.

4907 DIAGNOSIS AND TREATMENT OF CHRONIC ACTIVE HEPATITIS. (Ger.) Paumgartner, G. (Institut fur Klinische Pharmakologie, Murtenstrasse 35, CH-3010 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 108(4):120-123; 1978.

The diagnosis and therapy of chronic active hepatitis (CAH) are reviewed. Since CAH covers a histologically, biochemically, and clinically heterogeneous group of patients, there is no justification for treating all patients with this diagnosis with corticosteroids. While corticosteroids appear to be indicated in severe forms of CAH (characterized by bridge necroses, multilobular necrosis, cirrhotic transformation, and greatly increased transaminase levels), whether HBsAg-positive or negative, they should not, in general, be administered in mild forms (absence of bridge necroses, slight increase in transaminase levels, no or mild subjective symptoms). In CAH of medium severity, the risk should be carefully weighed against the benefit of the therapy in every individual patient. In HBsAg-negative patients, a therapeutic trial of at least 6 months is worthwhile. In HBsAg-positive patients, corticosteroid therapy should be delayed, because the symptoms tend to disappear spontaneously in 1-2 yr, and the effect of corticosteroids on the course of the disease is not sufficiently known. Once the decision for corticosteroid therapy has been made, 10 mg/day prednisolone and 50 mg/day azathioprine as a maintenance therapy is the treatment of choice. The therapy can be initiated with higher prednisolone doses (e.g., 30 mg/day during the first week, 20 mg/day during the next week, and 15 mg/day for 2 weeks). The prednisolone-azathioprine combination is approximately as effective as 15-20 mg/day prednisolone alone, but is associated with a lower incidence of side-effects. Azathioprine is contraindicated in patients with leukopenia, thrombocytopenia, and hypersensitivity.

4908 TREATMENT OF CHRONIC HEPATITIS. COMPARATIVE STUDY ON THE EFFECTIVENESS OF AZATHIOPRINE AND (+)-CYANIDANOL-3. (Ger.) Aguilar Reina, J.; de la Santa Lopez, J.; Cuadras Avellana, C. M.; Kern, A. (Postgraduate Medical Sch. of Internal Medicine, Seville, Spain). *Fortschr. Med.* 96(2):75-79; 1978.

Comparative clinical trials were performed with (+)-cyanidanol-3 (C, 3 x 500 mg/day, p.o.) and azathioprine (100 mg/day) in two matching groups of eight patients each with chronic persistent or chronic aggressive hepatitis. The patients were followed up for 6 months. The overall clinical results obtained in the two groups were equivalent. C proved to be more effective than azathioprine in terms of the normalization of the liver function tests (total bilirubin, levels of transaminases, and BSP retention), while azathioprine had a more favorable effect on the reduction of IgG and IgM than did C. While C had no side-effects in the eight patients, the azathioprine therapy had to be suspended temporarily because of leukopenia and/or thrombocytopenia in three of eight patients. The findings indicate the clinical advantages of C over immunosuppressive azathioprine in the treatment of patients with chronic persistent or aggressive hepatitis.

4909 TREATMENT OF HBsAg-POSITIVE CHRONIC ACTIVE HEPATITIS WITH HUMAN FIBROBLAST INTERFERON. (Eng.) Kingham, J. G. C.; Ganguly, N. K.; Shaari, Z. D.; Mendelson, R.; McGuire, M. J.; Holgate, S. J.; *et al.* (Southampton General Hosp., High Wycombe, Bucks, England). *Gut* 19(2): 91-94; 1978.

The cases of two patients with hepatitis B surface antigen (HBsAg)-positive chronic active hepatitis who were treated with human fibroblast interferon (10^7 U daily for 2 weeks) are presented. Before treatment, both patients had high levels of HBsAg, antibody to hepatitis B core antigen, and DNA-binding antibody in the blood, and one patient had a fourfold rise in serum aspartate aminotransferase (AST). During treatment, there was a striking fall in the core antibody titer and also in the DNA-binding antibody, which has been maintained for several months subsequently. In one patient the initially high AST level fell to normal. No significant adverse effects occurred, and these observations should encourage further trials of fibroblast interferon in hepatitis B treatment.

4910 DISTURBANCES OF THE EXOCRINE FUNCTION OF THE PANCREAS IN PATIENTS WITH CHRONIC HEPATITIS. (Rus.) Geller, L. I.; Ozherel'eva, N. Ia. (Medical Inst., Khabarovsk, USSR). *Klin. Med. (Mosk.)* 56(2):53-59; 1978.

The functional state of the exocrine tissue of the pancreas was studied in 59 patients with chronic hepatitis that developed after acute viral hepatitis. The patients could be divided into two groups: group 1 included 24 patients with mild activity of chronic hepatitis and group 2 included 34 patients with marked activity of chronic hepatitis. The i.v. injection of intestinal hormones (secretin and/or pancreozymin at 1.5 IU/kg) induced the escape of pancreatic enzymes into the blood and, subsequently, into the urine; functional disturbances of the exocrine tissue were more frequent and more pronounced among the patients from group 2. The pancreozymin test showed a marked decrease of secretion of pancreatic amylase, lipase, and trypsin into the duodenum (42.8 ± 8.6 IU, 19.0 ± 2.4 IU, and 28.8 ± 4.8 IU, resp., in group 1; 40.6 ± 8.3 IU, 11.9 ± 2.2 IU, and 16.9 ± 3.3 IU in group 2; 51.5 ± 4.2 IU, 27.1 ± 1.9 IU, and 50.1 ± 5.9 IU in healthy controls).

4911 RADIOIMMUNOASSAY FOR ANTIBODIES TO HUMAN LIVER-SPECIFIC MEMBRANE LIPOPROTEIN (LSP) IN CHRONIC ACTIVE HEPATITIS AND CHRONIC PERSISTENT HEPATITIS [Abstract]. (Eng.) McFarlane, I. G.; Jensen, D.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., Medical Sch., London, England). *Digestion* 16(4):355; 1977.

4912 CHRONIC HEPATITIS. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 2(6096):1171-1172; 1977.

See also, 4580, 4803, 4804, 4808, 4812, 4818, 4843, 4844, 4887, 4888, 4891, 4897, 4902, 4923, 4926, 4946.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

4913 PREREQUISITES OF ALCOHOLIC LIVER DAMAGE. (Ger.) Thaler, H. (Wilhelminenspital, Montleartstrasse 37, A-1171 Vienna, Austria). *Therapiewoche* 27(38):6580, 6582, 6585, 6587; 1977.

The relationships between the pattern of alcohol consumption and the development of liver cirrhosis are described on the basis of surveys conducted in France. The incidence of liver cirrhosis was found to increase enormously with the increase of the daily alcohol consumption above a critical threshold of 20 g pure alcohol in women, and considerably and steadily in men above a critical threshold of 60 g pure alcohol. Cirrhosis is observed usually after 6-yr chronic alcoholism; its incidence is 50% after 22-yr chronic alcoholism. The danger for the liver is continuous rather than intermittent alcohol consumption. The markedly lower alcohol tolerance of the liver in women may be due to genetic or hormonal factors. Alcohol tolerance is subject to considerable individual variations; there are chronic alcoholics who fail to develop cirrhosis after life-long major alcohol abuse. Cure or arrest of the pathological liver process in subjects with any degree of alcoholic liver damage requires strict abstinence, which cannot be replaced by any dietetic measure or drug treatment.

4914 ALCOHOLIC CIRRHOSIS OF THE LIVER IN THE SCANDINAVIAN COUNTRIES 1961-1974. (Eng.) Svendsen, H. O.; Mosbech, J. (County Hosp., St. Elisabeth, 2300 Copenhagen, Denmark). *Int. J. Epidemiol.* 6(4):345-348; 1977.

The numbers of deaths due to alcoholic liver cirrhosis in Sweden, Norway, Finland, and Denmark from 1961 to 1974 were compared. Mortality from alcoholic cirrhosis increased in Finland and Denmark 10-fold and 5-fold, resp., from 1961 to 1974. The increase was particularly marked since 1968. In Sweden, a threefold increase and in Norway, a doubling of mortality in men was ascribed to alcoholic liver cirrhosis. Mortality from nonalcoholic liver cirrhosis remained practically unchanged during this period. Increases in mortality from liver cirrhosis due to alcohol abuse run parallel with increases in alcohol consumption; the countries with the highest mortality had the highest consumption. The consumption of spirits predominates in Sweden, in Finland spirits and beer, in Denmark beer and wine, and in Norway spirits and beer. Doubling of alcohol consumption in a country was followed by a fourfold increase in the number of alcoholics, and by a fourfold increase in alcohol-induced diseases.

4915 THE CLINICOPATHOLOGICAL FEATURES OF THE ALCOHOLIC LIVER INJURY IN JAPAN AND ITS ETIOLOGICAL RELATIONSHIP TO HEPATITIS B VIRUS. (Eng.) Inoue, K. (Toyama Medical and Pharmaceutical Sch., Sugitani, Toyama City, 930-01 Japan). *Gastroenterol. Jpn.* 12(3):230-240; 1977.

The symptoms, physical findings, and laboratory tests of 73 patients with a history of excessive drinking (>150 g ethanol/day) were studied to clarify the clinicopathological features of alcoholic liver injury and the effect of hepatitis B virus (HBV) infection on this disease. Liver biopsies were performed on all patients, some more than once, giving 93 specimens. The sera of 53 patients were tested for HBV infection by an immune adherence hemagglutination test or radioimmunoassay for HB surface antigen (HBsAg). Blastogenesis in response to phytohemagglutinin (PHA) was tested in 26 patients and the macrophage migration inhibitory factor (MIF) assay in the presence of HBsAg was carried out in 25 patients. The main symptoms were anorexia (33 patients), general malaise (30), jaundice (19), ascites and vomiting (17), and nausea and vomiting (16). The chief physical findings were hepatomegaly (72 patients), ascites and edema (13), vascular spider (10), palmar erythema (10), and splenomegaly (4). The SGOT and SGPT values were abnormal in 60 and 46 patients, resp. Elevated values for serum bilirubin, alkaline phosphatase, and serum γ-globulin were observed in 30/60, 14/64, and 9/64 patients examined, resp. Histological diagnosis of the biopsy specimens noted 30 cases of wiremesh fibrosis, 11 of hepatic cirrhosis, 9 of fatty liver, 3 of subacute hepatitis (Tisdale), 3 of hemosiderosis, and 37 with nonspecific changes. Serum assays gave positive results for HBsAg, 3/53; anti-HBs, 6/38; anti-HBc, 5/24; and MIF, 6/25. Suppressed response to PHA was noted in 5/26 cases, which indicates but does not confirm the involvement of abnormal cellular immunity. However, low alcoholic hyalin incidence in this study correlates the pathogenesis of alcoholic liver injury with abnormal cellular immunity. The high number of positive assays correlates with the national norm for Japan and at most reflect previous HBV infection, which may modify the clinicopathological features. Histologically, in chronic alcoholics in Japan, the fibrosis of portal tracts frequently extends into the lobule pericellularly, thus forming the wiremesh fibrosis with scanty inflammatory changes. The reasons for the differences between Japan and western countries with respect to the features of cirrhosis have not been clarified.

4916 AMINOPYRINE BREATH TEST IN ALCOHOLIC LIVER DISEASE AND IN PATIENTS ON ENZYME-INDUCING DRUGS. (Eng.) Lewis, K. O.; Nicholson, G.; Lance, P.; Paton, A. (Dudley Road Hosp., Birmingham B18 7QH, England). *J. Clin. Pathol.* 30(11):1040-1043; 1977.

Liver function was assessed, using the ^{14}C-aminopyrine breath test, in 14 normal subjects, 16 patients with alcoholic cirrhosis, 14 alcoholics without cirrhosis, and 29 patients taking a variety of drugs. The normal value for the breath test was 8.6 ± 1.5%, whereas it was significantly lower (5.1 ± 3.8%) in patients with alcoholic cirrhosis. Higher than normal values were found in some alcoholic patients without cirrhosis and in patients receiving enzyme-inducing drugs, such as phenobarbitone. There was a significant correlation between serum gamma-glutamyltransferase and breath test in these groups ($r=0.61$, $p<0.05$). Some patients with alcoholic cirrhosis may also be capable of enzyme induction.

4917 GLUTAMATE DEHYDROGENASE: A RELIABLE MARKER OF LIVER CELL NECROSIS IN THE ALCOHOLIC. (Eng.) Van Waes, L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Br. Med. J.* 2(6101):1508-1510; 1977.

The usefulness of blood enzyme determinations as markers of liver necrosis was tested in 100 alcoholics who underwent biopsy. Mean values of glutamate dehydrogenase (GDH), SGOT, SGPT, ornithine carbamoyltransferase (OCT), and gammaglutamyltranspeptidase (gamma-GTP) tended to rise with increasing liver cell necrosis, though values of SGOT, SGPT, OCT, and gamma-GTP showed considerable overlap between the 32 patients with histologically proved hepatitis and the 68 without. By contrast, GDH values showed virtually no overlap between patients with and without hepatitis, and a value of 2.5 times the normal value discriminated between the two groups. Because of its easy determination and its reliable reflection of liver cell necrosis, the GDH concentration should be estimated routinely in alcoholic patients.

4918 GAMMA-GLUTAMYLTRANSPEPTIDASE IN THE HEPATIC ENZYME PROFILE OF THE ALCOHOLIC. (Fre.) Malarme, M.; Dumont, A.; Wettendorff, P.; Van Melsen, A.; Delcourt, A. (Service de Medecine, IMC d'Ixelles, 63 rue J. Paquot, B-1050 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 40(7/8):293-303; 1977.

A retrospective study was made on serum levels of 10 enzymes in patients with varying degrees of chronic alcoholism. There were no significant differences between 45 patients who abstained totally (group 1) and 45 patients who consumed less than 100 g ethanol/day (group 2). However, 80 patients who drank more than 100 g ethanol/day (group 3, 35 patients who had liver biopsies; group 4, 45 without liver biopsies) had significantly elevated levels of γ-glutamyl transpeptidase (γ-GT), leucine amino peptidase (LAP), lactic dehydrogenase (LDH), and 5'-nucleotidase (5'Nase, $p<0.001$ for group 4 patients). Group 3 patients had higher levels of γ-GT and LAP than group 4 patients ($p<0.01$), and they were elevated more frequently than the other enzymes in both groups 3 and 4: 71.1% and 47.5%, resp., in group 4 patients and 82.8% and 71.8%, resp., in group 3 patients. There was a statistically significant correlation ($r=0.8$) between γ-GT and LAP in groups 3 and 4. No correlation was found between γ-GT and 5'Nase or AP levels. Increased

γ-GT levels without the corresponding increase in LAP levels were not indicative of the degree of alcoholism, but of various other pathologies. The close correlation between γ-GT and LAP levels in chronic alcoholics suggests cellular impairment rather than enzymatic induction for the observed enzymatic alterations.

4919 SERUM ZINC AND SERUM COPPER AND INDICES OF DRUG METABOLISM IN ALCOHOLICS. (Eng.) Hartoma, T. R.; Sotaniemi, E. A.; Pelkonen, O.; Ahlqvist, J. (Aurora Hosp., Helsinki, Finland). *Eur. J. Clin. Pharmacol.* 12(2):147-151; 1977.

Serum zinc and copper levels were studied in relation to *in vitro* and *in vivo* drug metabolism in 25 alcoholics, some of whom had various liver diseases. Serum zinc was elevated in the six alcoholics with normal liver (160 ± 38.2 μg/100 ml) and in the seven with fatty liver (140.5 ± 30.7 μg/100 ml) and was low in the six with alcoholic hepatitis (105 ± 17.9 μg/ml) or cirrhosis (84.0 ± 129 μg/100 ml). There was a significant positive correlation ($r=0.69$, $p<0.001$) between serum zinc and cytochrome P-450 content of liver biopsies. The relationship between zinc and antipyrine half-life was significant and nonlinear ($p<0.001$). Serum copper level was elevated in all the alcoholics (203.9 ± 46.0 μg/100 ml versus 149.6 ± 25.7 μg/100 ml in controls), and no significant relationship was found between copper and drug metabolism in alcoholics. The findings suggest parallelism between changes in serum zinc and indices of drug metabolism in alcoholics.

4920 TREATMENT OF ALCOHOLIC HEPATITIS WITH ENCEPHALOPATHY: COMPARISON OF PREDNISOLONE WITH CALORIC SUPPLEMENTS. (Eng.) Lesesne, H. R.; Bozymski, E. M.; Fallon, H. J. (North Carolina Memorial Hosp., Chapel Hill, NC 27514). *Gastroenterology* 74(2, Part 1):169-173; 1978.

The results of prednisolone therapy in alcoholic hepatitis were compared with those of a regimen of 1,600 cal/day without prednisolone in 14 patients with alcoholic hepatitis and encephalopathy. All seven patients on caloric supplementation and two of seven given prednisolone died ($p<0.01$). These results suggest that prednisolone therapy reduced the mortality of those patients with alcoholic hepatitis and hepatic encephalopathy. This effect does not appear to be related to total caloric intake.

4921 BLOOD POLYMORPHONUCLEAR DYSFUNCTION IN PATIENTS WITH ALCOHOLIC CIRRHOSIS. (Eng.) Feliu, E.; Gougerot, M. A.; Hakim, J.; Cramer, E.; Auclair, C.; Rueff, B.; *et al.* (Hopital Bichat, 170 Boulevard Ney, 75877 Paris Cedex 18, France). *Eur. J. Clin. Invest.* 7(6):571-577; 1977.

Polymorphonuclear leukocyte function was investigated in 20 patients with alcoholic cirrhosis and 3 patients with cryptogenic cirrhosis. Bacterial ingestion, oxygen-dependent bactericidal capacity, and chemotactic response were measured. Serum-dependent abnormalities were common; they included deficiencies of ingestion and of all subsequent oxygen-dependent metabolic events (3 patients), all oxygen-dependent metabolic events (1 patient), cytochrome c reduction and iodination deficiencies (6 patients), isolated cytochrome c reduction deficiency (10 patients), and chemotactic deficiencies (14/18 patients). Serum-independent abnormalities were much less common; they included increased ingestion rate (4 patients), decreased stimulated reduction of nitroblue tetrazolium (3 patients), and decreased myeloperoxidase content (8 patients). Polymorphonuclear leukocyte abnormalities are frequent in cirrhosis and may account in part for increased susceptibility to infection in that disease.

4922 CHOLESTASIS IN ACUTE ALCOHOLIC LIVER DISEASE. (Eng.) Glover, S. C.; Brunt, P. W.; McPhie, J. L. (Royal Infirmary, Foresterhill, Aberdeen AB9 2ZB, Scotland). *Lancet* 2(8052/3):1305-1306; 1977.

Ten patients in a series of 108 patients with alcoholic liver disease, who presented with cholestasis associated with noncirrhotic alcoholic liver disease and without evidence of extrahepatic biliary obstruction, are reviewed. In seven patients, liver histology and the associated conditions presenting as cholestasis were heterogeneous. However, in three patients who had been drinking excessively before cholestatic jaundice developed, cholestasis was a major feature of liver histology. The term acute alcoholic cholestasis is suggested for this apparently distinct syndrome of cholestatic jaundice in the absence of hepatitis.

4923 SERUM PROLACTIN IN LIVER DISEASE AND ITS RELATIONSHIP TO GYNAECOMASTIA. (Eng.) Morgan, M. Y.; Jakobovits, A. W.; Gore, M. B. R.; Wills, M. R.; Sherlock, S. (Royal Free Hosp., London, England). *Gut* 19(3):170-174; 1978.

To determine whether prolactin plays a role in endocrine changes observed in chronic liver disease, serum immunoreactive prolactin was measured in 150 patients with liver diseases of varying etiology and severity and in 45 controls. The upper limit of the reference range for serum prolactin was 331 mU/l. Eighteen patients with liver disease (12%) had unexplained hyperprolactinemia. No relationship existed between the prolactin value and the sex of the patient, the etiology of the liver disease, the severity of the liver disease, or the presence of gynecomastia. The cause of the hyperprolactinemia in patients with liver disease and its clinical implications need further investigation.

4924 CLINICAL AND PATHOLOGICAL STUDY OF NON-CIRRHOTIC ACUTE ALCOHOLIC HEPATITIS [Abstract]. (Eng.) Karasawa, T. (Nihon Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):342; 1977.

4925 PATHOLOGY OF ALCOHOLIC LIVER INJURY IN JAPAN [Abstract]. (Eng.) Okudaira, M. (Sch. Medicine, Kitasato Univ., Kanagawa, Japan). *Gastroenterol. Jpn.* 12(4):340; 1977.

See also, 4435, 4478, 4480, 4481, 4808, 4809, 4814, 4822, 4831, 4906, 4938.

LIVER AND BILIARY TRACT

Cirrhosis

4926 THREE-DIMENSIONAL MORPHOLOGY OF THE LIVER IN CIRRHOSIS AND RELATED DISEASES. (Eng.) Takahashi, T. (Tohoku Univ. Sch. Medicine, Seiryo-machi, Sendai, Japan). *Virchows Arch. [Pathol. Anat.]* 377(2):97-110; 1978.

Livers removed at autopsy from three patients with cirrhosis, one with subacute hepatitis, and one with chronic persistent hepatitis were subjected to three-dimensional graphic reconstruction of nodules, interstitial septa, and blood vessels from serial histologic sections. In all cases of cirrhosis, adjacent cirrhotic nodules were connected to form a nodular network, in spite of their apparent separation in histologic sections. The nodules were linked in the form of chains with abundant anastomoses, and the network was "conjugate" with the intrahepatic vascular tree, as revealed by its close relationship to blood vessels. A parenchymal network of the same type was also found in the livers with subacute or chronic hepatitis, suggesting that this type of structure is common to cirrhosis and its precursor lesions and represents the geometrical configuration of hepatic parenchyma surviving zonal hepatic necrosis.

4927 PERITONEOVENOUS (LEVEEN) SHUNT: CONTROL OF RENIN-ALDOSTERONE SYSTEM IN CIRRHOTIC ASCITES. (Eng.) Witte, M. H.; Witte, C. L.; Jacobs, S.; Kut, R. (Arizona Medical Center, 1501 N. Campbell Ave., Tucson, AZ 85724). *JAMA* 239(1):31-33; 1978.

Because of the unusual clinical course of a patient with hepatic cirrhosis, refractory ascites, and hepatorenal syndrome, the complex interrelationships between massive ascites, renin-aldosterone activity, and renal and hepatic function before and after placement of a peritoneojugular vein (LeVeen) shunt could be examined. When the shunt was functioning, renin-aldosterone production was suppressed, the hepatorenal syndrome was reversed, and ascites remitted. These data suggest that the hyperreninemia, hyperaldosteronism, and functional renal abnormalities of this disorder are potentially reversible and arise primarily from the imbalance between formation and drainage of hepatosplanchnic lymph rather than from hepatocellular dysfunction, lowered plasma oncotic pressure, or portal hypertension.

4928 RELAPSING POLYRADICULITIS AFTER PORTOCAVAL ANASTOMOSIS. (Eng.) Vital, C.; Staeffen, J.; Series, C.; Terme, R.; Brechenmacher, C.; Pachebat, B. (Centre de Microscopie Electronique, 146, rue Leo-Saignat, F-33000 Bordeaux, France). *Eur. Neurol.* 17(2):108-116; 1978.

A case of relapsing polyneuritis in a 48-yr-old woman with alcoholic cirrhosis and a surgical splenorenal shunt is reported. Ultrastructural study of the nerve biopsy showed widespread segmental demyelinization with total myelin breakdown in most fibers; some Schwann cells were invaded by mononuclear cell processes. Such histological changes are characteristic of the Guillain-Barre syndrome. Alcoholism and diabetes were probably not the causative factors of the nerve damage. Toxic metabolites, such as those that cause portasystemic encephalopathy, were also present in this patient may have played a role in the nerve damage.

4929 EFFECT OF PORTACAVAL SHUNT ON SERUM BILE ACID CONCENTRATION IN PATIENTS WITH CIRRHOSIS. (Eng.) Poupon, R. E.; Poupon, R. Y.; Grosdemouge, M. L.; Erlinger, S. (Hopital Beaujon, F-92118 Clichy Cedex, France). *Digestion* 16(1/2):138-145; 1977.

The influence of portacaval shunt (PCS) on serum bile acid concentration was examined retrospectively in 47 cirrhotic patients. Cirrhotic patients with PCS had a significantly higher serum bile acid concentration than did cirrhotic patients without

PCS regardless of the duration between the diagnosis and the time of measurement ($p<0.001$). The serum bile acid concentration was significantly higher 3 to 12 months after PCS (67.90 ± 15.90 μM, $p<0.001$) and 12 months or more after PCS (94.11 ± 33.86 μM, $p<0.001$) than before the shunt (18.98 ± 13.62 μM). The mean concentration 12 months or more after PCS was significantly higher than that found 3 to 12 months after shunt ($p<0.02$). This progressive increase in serum bile acid concentration may indicate a deterioration of hepatic function in shunted patients.

4930 A PATIENT WITH RECURRENT HEPATIC ENCEPHALOPATHY AND CHRONIC RENAL FAILURE TREATED SUCCESSFULLY WITH LONG-TERM HEMODIALYSIS. (Eng.) Kaneda, H.; Haruyama, T.; Chiba, S.; Sugai, Y.; Hirasawa, T.; Takeuchi, M.; *et al.* (Iwaki-Kyoritsu General Hosp., Iwaki, Japan). *Tohoku J. Exp. Med.* 123(3):227-234; 1977.

The case of a 38-yr-old man with chronic recurrent hepatic encephalopathy due to liver cirrhosis complicated by chronic renal failure who was maintained well by regular hemodialysis for 14 months is presented. Only four episodes of hepatic encephalopathy occurred in this period. Each of four episodes of disturbed consciousness was accompanied by slightly elevated blood ammonia levels. Energetic serial dialysis for 5 to 7 days was necessary for its recovery. It is concluded that hemodialysis is an effective treatment for recurrent hepatic encephalopathy.

4931 RENAL BLOOD FLOW IN CIRRHOSIS: RELATION TO SYSTEMIC AND PORTAL HAEMODYNAMICS AND LIVER FUNCTION. (Eng.) Ring-Larsen, H. (Rigshospitalet, 9 Blegdamsvej, DK-2100 Copenhagen 0, Denmark). *Scand. J. Clin. Lab. Invest.* 37(7):635-642; 1977.

To investigate the mechanism precipitating changes in renal blood flow (RBF) in cirrhosis, the RBF was measured by the ^{133}Xe-washout method in 70 patients with this disease. The average RBF in controls was 3.72 ml/g/min compared with 2.34 in the patients without ascites, 1.82 in the decompensated patients, 1.47 in the patients with azotemia, and 1.13 in the patients with additional oliguria. The RBF was not significantly correlated to changes in the systemic or portal hemodynamics. Likewise it was not correlated to any biochemical test of liver function except the serum albumin concentration ($r=+0.48$, $p<0.01$). It is concluded that a reduction in RBF in cirrhosis is frequently present before sodium and water retention is clinically evident and before there is laboratory proof of impairment of renal function. A subnormal serum albumin concentration may be one factor among several leading to renal hypoperfusion in cirrhosis.

4932 CLINICAL VALUE OF HEPATIC VEIN CATHETERIZATION: IMPROVED PRACABILITY [sic] BY BALLOON CATHETER TECHNIQUE. (Eng.) Butzow, G. H.; Novak, D. (Medizinische Klinik der Universitat Hamburg, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Gastrointest. Radiol.* 2(2):153-161; 1977.

Experiences in venographic and hemodynamic investigations of the liver outflow tract are described. Hepatic venous pressure measurements were attempted in 100 patients with the balloon catheter technique. In 32 of these cases, hepatic venous pressure measurements and hepatic occlusion phlebography were combined. In five cases it was impossible to insert one of the catheters into a liver vein ostium. In the 63 patients with liver cirrhosis, a significant ($p<0.001$) elevation of hepatic venous pressure was found. A decrease of the pressure gradient was seen after portacaval and splenorenal shunt operations. Hepatic occlusion phlebography showed alterations of hepatic veins only in patients with cirrhosis. There was a rough correlation between pressure gradients and the extent of changes in the liver veins. Hepatic occlusion phlebography in patients who had undergone shunt procedures demonstrated collaterals of three different types: (1) tiny vessels in the gallbladder region, (2) recanalization of the umbilical vein, and (3) development of large portosplanchnic bridging anastomoses. In patients with portacaval shunt, missing collaterals or development of only tiny vessels in the gallbladder were associated with markedly lower pressure gradients (1, 4, 5, and 8 mm Hg) compared with large collaterals found in patients with large pressure gradients (12, 13, 16, and 25 mm Hg), which suggests that the development of large collaterals depends upon augmented intrahepatic pressure due to increased arterial influx and marked outflow obstruction. Proximal occlusion venography is a valuable method to demonstrate the direction of portal flow and the patency of an anastomosis due to its clear and contrast-rich opacification and minimum risk to the patient.

4933 SELECTION OF OPERATION IN PATIENTS WITH BLEEDING ESOPHAGEAL VARICES. (Eng.) Langer, B.; Patel, S. C.; Stone, R. M.; Colapinto, R. F.; Phillips, M. J.; Fisher, M. M. (Toronto General Hosp., Toronto, Ontario M5G 1L7, Canada). *Can. Med. Assoc. J.* 118(4):369-372; 1978.

The results of surgical treatment of bleeding esophageal varices over an 8-yr period in 155 patients are reviewed. Primary treatment of bleeding was conservative, with the i.v. administration of vasopressin and balloon tamponade. Emergency operations were carried out after 48 hr in 63 patients with persistent bleeding who were surgical candidates. Operative mortality was higher in this group (40%) than in the 39 patients undergoing elective surgery or in the 53 patients who underwent urgent operations (each 10%). Postoperative encephalopathy occurred in 35% of patients and was correlated closely to late death after establishment of a shunt. In an uncontrolled trial, 86 patients underwent a portacaval shunt, 32 underwent a distal splenorenal shunt, and 13 underwent a mesocaval shunt; the operative mortality rates were 23%, 16%, and 31%, resp. Postoperative encephalopathy occurred in 50%, 7%, and 44%, resp., and late death occurred

in 33%, 11%, and 11%, resp. A controlled trial in 22 patients who underwent a distal splenorenal shunt and 21 who underwent a portacaval shunt showed that the operative mortality rates were 18% and 0%, resp. Postoperative encephalopathy occurred in 6% and 29%, resp., and late death occurred in 11% and 14%, resp. These results indicate that the distal splenorenal shunt is associated with a lower rate of postoperative encephalopathy.

4934 INCREASED TRANSCAPILLARY ESCAPE RATE OF ALBUMIN IN PATIENTS WITH CIRRHOSIS OF THE LIVER. (Eng.) Parving, H. H.; Ranek, L.; Lassen, N. A. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400, Copenhagen NV, Denmark). *Scand. J. Clin. Lab. Invest.* 37(7):643-648; 1977.

The transcapillary escape rate of albumin, i.e., the fraction of the intravascular mass of albumin that passes to the extravascular space per unit time, was determined from the disappearance of i.v. injected ^{125}I-labeled human serum albumin during the first 60 min after injection in nine patients with liver cirrhosis. Six patients had ascites. The wedged hepatic venous pressure or splenic pulp pressure ranged from 20 to 30 mm Hg (mean 26 mm Hg). The plasma albumin concentration was low, but plasma volume was slightly elevated, and thus the intravascular mass of albumin was only moderately reduced. The transcapillary escape rate of albumin was significantly elevated in all patients (mean 10.2%/hr, range 8.8 to 12.3%/hr), in comparison with the values of 28 normal subjects (5.4%/hr, range 3.5-7.2%/hr). These results can best be explained by increased filtration out of the vessels in the portal system, due to the increased portal venous pressure. The increased transcapillary escape rate of albumin probably contributes to the formation of edema and ascitic fluid.

4935 POOL SIZE, SYNTHESIS, AND TURNOVER OF SULFATED AND NONSULFATED CHOLIC ACID AND CHENODEOXYCHOLIC ACID IN PATIENTS WITH CIRRHOSIS OF THE LIVER. (Eng.) Stiehl, A.; Ast, E.; Czygan, P.; Frohling, W.; Raedsch, R.; Kommerell, B. (Univ. Heidelberg, Dept. Medicine, 6900 Heidelberg, Bergheimerstr. 58, W. Germany). *Gastroenterology* 74(3): 572-577; 1978.

Because sulfation of bile acids is a quantitatively important pathway of bile acid metabolism in patients with liver disease, the kinetics of sulfated ^{14}C-cholic and ^{14}C-chenodeoxycholic acids were studied and compared with the kinetics of unsulfated ^{14}C-cholic and ^{14}C-chenodeoxycholic acids. In five patients with liver cirrhosis, sulfated and unsulfated ^{14}C-cholic and ^{14}C-chenodeoxycholic acids were administered i.v. and the specific activity curves were determined. Specific activities declined exponentially, and pool sizes, synthesis rates, and turnover rates of bile acids were calculated on the basis of a one-pool system. The mean biological half-life of cholic acid was 4.3 ± 1.6 days and of chenodeoxycholic acid was 2.8 ± 1.2 days. The half-life of cholic acid sulfate was 0.7 ± 0.5 day and of chenodeoxycholic acid sulfate was 0.8 ± 0.5 day. The pool size of cholic acid was 513 ± 103 mg; of chenodeoxycholic acid, 477 ± 77 mg; of cholic acid sulfate, 4.7 ± 1.0 mg; and of chenodeoxycholic acid sulfate, 38.7 ± 4.0 mg. The daily synthesis of cholic acid was 90 ± 14 mg; of chenodeoxycholic acid, 118 ± 6 mg; of cholic acid sulfate, 7.2 ± 2.1 mg; and of chenodeoxycholic acid sulfate was 32.6 ± 3.2 mg. The data indicate that sulfate esters of bile acids are excreted more rapidly than are unsulfated bile acids. More than one-fourth of the chenodeoxycholic acid but less than one-tenth of the cholic acid formed was sulfated. The preferential sulfation of chenodeoxycholic acid is responsible for the more rapid turnover of chenodeoxycholic acid in comparison to cholic acid. Sulfation enhances the excretion and thereby prevents the accumulation of hepatotoxic concentrations of chenodeoxycholic acid in patients with cirrhosis.

4936 SERUM PROTEINS IN HEPATIC DISEASE. (Eng.) Teloh, H. A. (Holy Cross Hosp., Ft. Lauderdale, FL 33307). *Ann. Clin. Lab. Sci.* 8(2):127-129; 1978.

The serum protein changes occurring in liver disease associated with parenchymal damage are described. Characteristically, there is a decrease in serum albumin and an increase in gamma globulin levels. Among 400 unselected patients with hepatic cirrhosis, abnormal serum electrophoretic patterns were seen in 78.2% patients with alcoholic cirrhosis, 96.3% with active chronic hepatitis, and 56% with hemochromatosis. Beta-gamma bridging (an abnormal band between the beta and gamma globulins) in the electrophoretogram is highly characteristic of alcoholic cirrhosis. Variation of alpha 1, alpha 2, and beta fractions is inconstant and is not of great diagnostic or prognostic value. The increase in the gamma fraction is polyclonal (due first to an increase in IgM followed by an increase in IgG), nonspecific, and not of diagnostic value in viral hepatitis. Elevation of the IgA fraction is not as constant or prominent.

4937 CIRCULATING IMMUNE COMPLEXES AND COMPLEMENT ACTIVATION IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Wands, J. R.; Dienstag, J. L.; Bhan, A. K.; Feller, E. R.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. Med. J.* 298(5):233-237; 1978.

Twenty patients with primary biliary cirrhosis and seven controls with extrahepatic biliary obstruction were examined for the presence of circulating immune complexes. Serologic evidence of alternate complement-pathway activation had been found in 8 of the 20. Immune complexes were isolated by cryoprecipitation from serum and measured directly by the sensitive Raji-cell radioimmunoassay. Cryoproteins, found in high concentrations in 90% of the patients with cirrhosis but undetectable in the controls, were composed of IgM (60%), IgG-IgM (25%),

and IgA-IgM (5%), and were capable of activating the complement system *in vitro*. Immune complexes detected by the Raji assay were found in 95% of the patients with cirrhosis and circulated in exceedingly high concentrations (474 µg/ml; range, 16.2-2,192) but were absent in the controls. Furthermore, the alternate complement pathway was activated in eight cirrhotic patients. These complement-fixing immune complexes differ from immune complexes isolated in other types of liver diseases and may be important in the pathogenesis of primary biliary cirrhosis.

4938 THYROID FUNCTION AND THYROID REGULATION IN EUTHYROID MEN WITH CHRONIC LIVER DISEASE: EVIDENCE OF MULTIPLE ABNORMALITIES. (Eng.) Green, J. R. B.; Snitcher, E. J.; Mowat, N. A. G.; Ekins, R. P.; Rees, L. H.; Dawson, A. M. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Clin. Endocrinol.* 7(6):453-461; 1977.

To clarify the role of the liver in the extrathyroidal conversion of thyroxine (T4) to triiodothyronine (T3), the total and free serum T4 and T3, basal serum thyrotrophin (TSH), and the serum TSH response to a standard i.v. dose of thyrotrophin releasing hormone (TRH) were measured in 15 men with liver cirrhosis and in 8 alcoholic men with fatty liver change. All patients were clinically euthyroid. In the cirrhotics, total T4 and free T4 (FT4) concentrations were normal as were free T3 (FT3) concentrations, but total T3 concentrations were significantly reduced in the cirrhotics ($p<0.005$), and basal TSH concentrations were significantly higher than normal ($p<0.01$). Alcoholics with fatty liver change had normal basal TSH concentrations and normal total and free thyroid hormone concentrations apart from reduced FT4 ($p<0.01$). Correlation of thyroid function tests with liver function (serum albumin concentration) showed significant positive correlations for serum albumin with both total T3 and FT3 and significant negative correlations with both FT4 and basal TSH. Nine of 15 cirrhotics had an abnormal serum TSH response to TRH, the commonest abnormal pattern being a delayed response (7 patients). Three of eight alcoholics with fatty liver change also had an abnormal TSH response to TRH. These findings not only show complex disturbances in hypothalamic-pituitary-thyroid relationships in chronic liver disease but also provide indirect evidence of reduced extrathyroidal conversion of T4 to T3.

4939 EXAGGERATED NATRIURETIC RESPONSE TO VOLUME EXPANSION IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS. (Eng.) Chaimovitz, C.; Rochman, J.; Eidelman, S.; Better, O. S. (Rambam Hosp., Haifa, Israel). *Am. J. Med. Sci.* 274(2):173-178; 1977.

To clarify the observation that fluid retention and ascites are frequent in patients with Laennec's cirrhosis but rare in patients with primary biliary cirrhosis (PBC), renal handling of sodium was studied during extracellular volume expansion (ECVE) and maximal suppression of antidiuretic hormone in five patients with PBC. These PBC patients were compared with two control populations: five edema-free patients with Laennec's cirrhosis and nine healthy volunteers. The natriuretic and diuretic response to ECVE was significantly greater in the patients with PBC as compared with the two control groups. The glomerular filtration rate (GFR, V/GFR x 100) averaged 28.8 ± 3.9 ml/min in PBC patients, which was significantly higher than the 17.6 ± 5.9 ml/min in Laennec's cirrhosis and 21.2 ± 2.4 ml/min in the normal controls ($p<0.001$). Sodium clearance was 8.7 ± 1.9 ml/min in the PBC patients, 3.5 ± 1.2 ml/min in Laennec's cirrhosis, and 4.2 ± 1.4 ml/min in controls ($p<0.001$). The rate of urinary sodium excretion was 1,074 ± 253 µEq/min in PBC and 475 ± 150 µEq/min in Laennec's cirrhosis ($p<0.001$); the naturesis in normal controls was 743 ± 414 µEq/min, which was not significantly different from that in PBC. Water clearance for given rates of urine flow were similar in PBC patients as compared with normals. The data suggest that a supranormal rejection of sodium at the proximal tubule in response to ECVE underlies the exaggerated natriuresis of PBC. The augmented elimination of salt during ECVE in patients with PBC may explain the rarity of ascites and edema in this variety of cirrhosis.

4940 COMPARISON BETWEEN REINFUSION OF CONCENTRATED ASCITIC FLUID (RHODIASCIT) PLUS DIURETICS AND DIURETIC TREATMENT IN ASCITIC CIRRHOSIS: A RANDOMIZED CONTROLLED TRIAL. (Eng.) Maniscalco, E.; Rinaldi, F.; Cottone, M.; DiFranco, C.; Filippazzo, G.; Pagliaro, L.; *et al.* (Ospedale V. Cervello, Via Trabucco 180, Palermo, Italy). *Rend. Gastroenterol.* 9(3):199-201; 1977.

A single reinfusion of concentrated (3x) ascitic fluid (Rhodiascit, 250-300 ml/hr) in 18 cirrhotic patients was compared with conventional diuretic treatment (spironolactone, 300-400 mg/day plus furosemide, 20-40 mg/day on alternate days until clinical disappearance of the ascites, followed by 100-150 mg/day of spironolactone and 20-40 mg/day, 2x/week of furosemide) in 16 cirrhotic patients to assess the usefulness of the first technique. Patients were randomly assigned to the two treatment groups. Patients in the first group recovered more rapidly (8 ascites-free compared to none in the latter group at the end of the first week); at discharge (30-35 days after beginning of treatment), 11/18 patients in the first group and 8/16 patients in the latter group were ascites-free. However, long-term follow-up (1 yr) showed that there was no significant difference between the two groups with regard to recurrence rate or survival rate. The technique is useful primarily to increase the speed of recovery.

4941 ACANTHOCYTOSIS IN CIRRHOSIS. REPORT OF FOUR CASES AND REVIEW OF THE LITERATURE. (Fre.) Gisselbrecht, C.; Metreau, J. M.; Dhumeaux, D.; Dreyfus, B. (Hopital Henri-Mondor, F 94010 Creteil, France). *Gastroenterol. Clin. Biol.* 1(8/9):621-628; 1977.

Acanthocytosis associated with alcoholic cirrhosis and severe hepatocellular failure is described in four new cases and recent literature on the subject is reviewed. The acanthocytes, which comprised 20-100% of all RBC in these patients, could be identified and differentiated from echinocytes by phase contrast microscopy of fresh blood preparations. Hemolysis varied from 2.4 to 4.8% of total RBC mass per day. ^{51}Cr-tagged RBC from both auto- and allotransfusions had a half-life of 12.5 to 19 days, compared to normal values of 26 to 33 days. The high ratio of free cholesterol/phospholipids in the plasma and, consequently, in the RBC membranes, presumably weakens the RBC, which are then further distorted into acanthocytes in the spleen. The patients' survival was less than 1 yr, and death was generally caused by hepatic failure rather than hyperhemolysis. Splenectomy will suppress the hemolysis, but this surgery can rarely be attempted in these high-risk patients.

4942 α-FETOPROTEIN SCREENING IN PATIENTS WITH IDIOPATHIC HEMOCHROMATOSIS AND LIVER CIRRHOSIS. (Eng.) Chayvialle, J. A. P.; Brissot, P.; Pelletier, M. J.; Hita de Nercy, Y.; Lambert, R.; Bourel, M. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Digestion* 16(1/2):118-127; 1977.

To assess the diagnostic value of α-fetoprotein in malignant hepatoma, the serum α-fetoprotein level was measured by radioimmunoassay in 200 patients when admitted to hospital, 63 with idiopathic hemochromatosis and 137 with liver cirrhosis. In addition, repeated controls were performed in 19 subjects of each group for a mean period of 11 months (range 3-18 months). Elevated α-fetoprotein levels were observed initially or during the study period in 15 patients, a malignant liver tumor being demonstrated in 12. In four of these patients, the abnormal α-fetoprotein concentration was the clue to the diagnosis of an unsuspected malignant hepatoma, but in none of these cases could the tumor be resected. The results indicate that screening the serum α-fetoprotein level may contribute to the detection of malignant hepatoma in high-risk clinical groups.

4943 THE EFFECT OF GLUCOSE ORAL ADMINISTRATION ON HYPERAMMONEMIA IN CIRRHOTICS. (Eng.) Schlienger, J. L.; Imler, M. (Laboratoire de Pathologie Interne et Experimentale de la Clinique Medicale B, Universite Louis Pasteur, 67005 Strasbourg Cedex, France). *Clin. Chim. Acta* 82(1/2):61-67; 1978.

To investigate the controverted effect of glucose on hyperammonemia, the diet of eight advanced cirrhotics was supplemented hourly, between 9 a.m. and 5 p.m., with 20 g of p.o. glucose. Plasma insulin and arterial and median cubital venous ammonia levels were measured hourly, and the results were compared to those of a control test performed in the same patients without glucose supplementation. In the control test, the lunch (protein meal) induced an identical rise in arterial and venous ammonia levels (+40 ± 3 and +36 ± 5 μg/100 ml, resp.). With glucose supplementation, plasma insulin rose significantly ($p<0.02$) and the arterial ammonia increase produced by lunch (+42 ± 3 μg/100 ml) did not differ from that observed in the control test; however, the rise in venous ammonemia was lower (+12 ± 4 μg/100 ml, $p<0.01$) with a significant increase in arteriovenous ammonia difference ($p<0.01$). These results suggest that p.o. glucose administration increases the peripheral muscular ammonia uptake through a mechanism that remains to be elucidated but which is inefficient for arterial hyperammonemia.

4944 HAEMODYNAMIC STUDIES IN VINYL CHLORIDE MONOMER WORKERS WITH PORTAL HYPERTENSION [Abstract]. (Eng.) Blendis, L. M.; Smith, P. M.; Lawrie, B. W.; Stephens, M. R.; Evans, W. D. (Welsh Natl. Sch. Medicine, Cardiff, Wales). *Gut* 18(5): A400-A401; 1977.

4945 KINETICS OF ORAL AND INTRAVENOUS RADIOCOPPER IN NORMAL SUBJECTS AND PATIENTS WITH PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Vierling, J. M.; Rumble, W. F.; Aamodt, R. L.; Shrager, R.; Berman, M. D.; Jones, E. A. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Bethesda, MD). *Gastroenterology* 72(5, Part 2): 1185; 1977.

4946 COMPARTMENTAL ANALYSIS OF HEPATIC RETICULOENDOTHELIAL (HRE) CLEARANCE IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) Vierling, J. M.; Jaffe, C. J.; Lawley, T. J.; Frank, M. M.; Jones, E. A. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1183; 1977.

4947 PORTAL HYPERTENSION AND BLEEDING ESOPHAGEAL AND GASTRIC VARICES: A SURGICAL APPROACH TO TREATMENT. (Eng.) Ellis, P. D. (Indiana Univ. Sch. Nursing, 1100 W. Michigan St., Indianapolis, IN 46202). *Heart Lung* 6(5):791-798; 1977.

4948 PRIMARY BILIARY CIRRHOSIS WITH UNUSUAL VASCULAR SKIN CHANGES. (Eng.) Harman, R. R. M. (Weston-super-Mare General Hosp., England). *Br. J. Dermatol.* 97(Suppl. 15):62-65; 1977.

4949 SPONTANEOUS PERITONITIS OF CIRRHOSIS DUE TO Listeria monocytogenes. (Eng.) Rheingold, O. J.; Chiprut, R. O.; Dickinson, G. M.; Schiff, E. R. (Veterans Admin. Hosp., Miami, FL 33125). *Ann. Intern. Med.* 87(4):455-456; 1977.

4950 BLEEDING MUCOSAL LESIONS IN THE UPPER GASTROINTESTINAL TRACTS OF PATIENTS WITH OESOPHAGEAL VARICES AND HEPATIC CIRRHOSIS. (Eng.)

Hislop, I. G.; Hall, P.; Grant, A. K. (Queen Elizabeth Hosp., Woodville Rd., Woodville, South Australia 5011, Australia). *Aust. N.Z. J. Surg.* 46(3):202-205; 1976.

4951 COPPER TOXICITY IN PRIMARY BILIARY CIRRHOSIS [Letter to Editor]. (Eng.) Scott, L. D.; Dickson, E. R.; Owen, C. A. (Univ. Texas Medical Sch., Houston, TX 77025). *Gastroenterology* 74(2, Part 1):333-334; 1978.

4952 ZINC INGESTION IN CIRRHOTIC PATIENTS [Abstract]. (Eng.) Sullivan, J. F.; Jetton, M.; Burch, R. E. (Dept. Medicine, Creighton Univ., Omaha, NB). *Am. J. Clin. Nutr.* 31(4):718; 1978.

See also, 4481, 4588, 4600, 4603, 4614, 4660, 4714, 4719, 4803, 4804, 4806, 4809, 4811, 4814, 4826, 4841, 4843, 4864, 4887, 4890, 4903, 4904, 4906, 4923, 5000.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

4953 INTRAOPERATIVE LIVER BIOPSY FOR GALLBLADDER DISORDERS. (Ger.) Braune, R.; Ladewig, R. (Chirurgische Klinik, Ernst-Moritz-Arndt-Universitat, Fr.-Loeffler-Str. 23b, DDR-22 Greifswald, E. Germany). *Zentralbl. Chir.* 103(1):55-58; 1978.

Liver biopsy specimens were taken intraoperatively from a random series of 447 patients operated on for gallstones. The histological changes found in the liver biopsy specimens were banal or only slightly pathological in over 90% of all cases, and the hepatic changes failed to correlate with the histological changes of the gallbladder or with the duration of cholelithiasis. The findings indicate that routine liver biopsy during surgery for cholelithiasis is unnecessary and should be restricted to selected cases.

4954 LAPAROSCOPY IN CHOLESTASIS. (Ger.) Lindner, H. (Deutsches Rotes Kreuz Krankenhaus, Hamburg, W. Germany). *Therapiewoche* 26(41): 6396, 6398-6399; 1976.

Laparoscopy was performed in 382 patients with suspected cholestasis. Anicteric or subicteric cholestasis was diagnosed on the basis of the laparoscopic and complementary examinations in 57 cases, icteric cholestasis in 19, viral hepatitis with cholestasis in 30, cholecystitis in 66, gallbladder carcinoma in 21, liver metastases in 72, primary liver carcinoma in 20, pancreatic carcinoma in 24, drug-induced hepatopathy in 31, and primary biliary cirrhosis in 42. Green liver was not found in all cases of extrahepatic obstruction syndrome; it was not possible to distinguish between recent intrahepatic and extrahepatic cholestasis from the color of the liver. Green liver was also found in patients with acute viral hepatitis and alcoholic hepatitis with cholestasis. Pancreatic carcinoma was not detected in 85% of the 24 patients with carcinoma of the pancreas, but it was detected by laparoscopy in 22/24 cases. Injected vessels and adhesions of the gallbladder are indicative of cholecystitis, cholecytolithiasis, or choledocholithiasis. Laparoscopy is suitable for the exact staging of primary liver cirrhosis ranging from ductular lesions to nodular green cirrhosis. Laparoscopy should always precede laparotomy in the differential diagnosis of cholestases.

4955 NONVISUALIZATION OF THE GALLBLADDER BY ^{99m}Tc-HIDA CHOLESCINTIGRAPHY AS EVIDENCE OF CHOLECYSTITIS. (Eng.) Pare, P.; Shaffer, E. A.; Rosenthall, L. (Faculty Medicine, Univ. Calgary, Calgary, Alberta T2N 1N4, Canada). *Can. Med. Assoc. J.* 118(4):384-386; 1978.

The significance of nonvisualization of the gallbladder by cholescintigraphy with N-substituted iminodiacetic acid (HIDA) labeled with ^{99m}technetium in comparison with standard radiologic examinations was studied. In 43 healthy subjects, the gallbladder was visualized by the two methods. By contrast, all 27 patients in whom the gallbladder was not visualized by cholescintigraphy had cholecystitis. When visualization failed to occur, repeat cholescintigraphy after an injection of cholecystokinin (1 Crick-Harper Raper U/kg, i.v.) demonstrated the status of the cystic duct. Visualization excludes cystic duct obstruction and acute cholecystitis, whereas persistent nonvisualization indicates cystic duct obstruction.

4956 CONTEMPORARY METHODS IN THE DIAGNOSIS AND TREATMENT OF NONCALCULOUS CHOLECYSTITIS. (Rus.) Galkin, V. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 49(10): 110-115; 1977.

Various aspects of the diagnosis and treatment of noncalculous cholecystitis (NC) are reviewed. NC is frequently accompanied by dyskinesia of the gallbladder. The chief diagnostic technique is examination of the bile: increased bile content

(compared to the normal values) in the gallbladder and slow excretion of bile are indicative of hypo- or atonic dyskinesia of the gallbladder. Treatment includes dieting, antibiotics (penicillin, 300,000 IU q.i.d. for 10 days, i.m. or 100,000-500,000 IU/day, intraduodenally; streptomycin, 0.5 g b.i.d.; erythromycin, 600,000-800,000 IU/day; and tetracycline, 500,000 IU/day for 3 weeks, p.o.), and choleretic drugs.

4957 DESTRUCTIVE CHOLECYSTITIS IN CHILDREN. (Rus.) Grigovich, I. N.; Mikhalkina, A. T. (Dept. Pediatric Surgery, State Univ., Petrozavodsk, USSR). *Khirurgiia* (1):89-92; 1978.

The case histories of 57 children (aged 2 months to 14 yr) with destructive cholecystitis are reviewed. Seventeen children had intercurrent diseases; 7 had diseases of the respiratory system, 7 had intestinal infections, 1 had scarlet fever, 1 had massive passage of worms, and 1 had abdominal trauma. The first clinical symptoms of destructive cholecystitis included abdominal pain (53), vomiting (40), fever (43), and suppression of the stool (23). Only three patients were correctly diagnosed, while in the rest the disease was initially misdiagnosed as acute appendicitis, intestinal obstruction, or acute cholecystitis. Surgery included cholecystectomy (51), cholecystostomy (3), cholecystostomy with removal of the ascarides (1), and formation of ileostoma without revision of abdominal organs (1). At surgery, 35 patients were found to have phlegmona of the gallbladder, 10 to have gangrene of the gallbladder, 5 to have necrosis due to the entropion, 6 to have perforation of the gallbladder wall, and 1 to have concrements. Of 57 patients, 52 were cured and 4 died (1 patient could not be followed up).

4958 NON-SURGICAL ENDOSCOPIC PAPILLOTOMY IN 10 PATIENTS WITH CHOLEDOCHOLITHIASIS. (Dut.) Tytgat, G. N.; Bartelsman, J.; Huibregtse, K.; Agenant, D. (Kliniek voor Inwendige Geneeskunde, Wilhelmina Gasthuis, Universiteit van Amsterdam, Amsterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(39):1504-1508; 1977.

Ten patients with choledocholithiasis underwent nonsurgical endoscopic papillotomy. Surgical intervention was contraindicated in seven patients due to advanced age with and without concomitant diseases (cardiac decompensation, emphysema, or liver cirrhosis). Three patients also had jaundice. The endoscopic papillotomy was successful in all 10 cases. Only one patient developed a complication (relatively mild pancreatitis). The findings indicate that endoscopic papillotomy is a good alternative to surgery in the treatment of retained common bile duct stones, especially in high-risk patients.

4959 THE NON-SURGICAL TREATMENT OF GALLSTONES LEFT BEHIND IN THE COMMON BILE DUCT. (Dut.) Leguit, P. (Heelkundige Kliniek, Binnengasthuis, Amsterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(39):1500-1503; 1977.

Nonsurgical methods for the removal or dissolution of residual gallstones in the common bile duct are reviewed. Gallstones can be dissolved by irrigation through a T-tube with ether, ethanol-chloroform mixtures, physiological saline solution, heparin-salt solutions, or sodium cholate solution. It is also possible to use the T-tube canal to remove gallstones mechanically by means of instruments. Gallstones can also be removed through the papilla of Vater by endoscopic retrograde cannulization with or without electrosurgical papillotomy. Bile acids, such as chenodeoxycholic acid, and spasmolytics can be used as drugs to dissolve residual stones.

4960 TREATMENT OF CHOLELITHIASIS WITH CHENODEOXYCHOLIC ACID. EXPERIENCE FROM A 6-MONTH PERIOD. (Hun.) Magyar, I.; Papp, J.; Kisfaludy, S.; Feher, T.; Abonyi, M.; Hajos, E. (I. Belgyogyaszati Klinika, Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Orv. Hetil.* 117(50):3040-3047; 1976.

Ten patients with cholelithiasis were treated with chenodeoxycholic acid (3 x 250 mg/day, p.o.). The length of the treatment was at least 6 months in 9 cases. The bile stones failed to give a positive shadow before the treatment. Complete dissolution of the stones was seen within 3 months in three patients; the treatment had to be suspended in three other patients because of complications, while the other four patients are still under treatment but have shown no change after 6 months. The treatment caused no substantial changes in the serum bile pigment, cholesterol, triglyceride, or alkaline phosphatase levels, while the SGOT level showed a slight increase in some cases. The findings indicate that chenodeoxycholic acid treatment can be expected to be most efficient in patients with properly filling, normally functioning gallbladders, and with stones having negative shadow and low lithogenic index.

4961 DISSOLUTION OF HUMAN GALLSTONE WITH CLOFIBRATE. (Eng.) Garcia-Romero, E.; Lopez-Cantarero, M.; Arcelus, I. M. (Hospital Clinico San Cecilio, Univ. Granada, Granada, Spain). *J. Surg. Res.* 24(1):62-64; 1978.

The effect of different concentrations of clofibrate upon biliary cholesterol calculi was studied using 22 gallstones from one patient who had undergone cholecystectomy. All the calculi completely dissolved within the first 25 days after being placed in contact with the clofibrate solution. The rate of dissolution of the calculi was directly proportional to the concentration of clofibrate in the solution used (250, 500, 1,000, or 1,500 mg in 5 ml of ethyl alcohol). With the 1,500-mg clofibrate solution, the calculi were completely dissolved within 15 days. Clofibrate possesses a greater litholitic capacity than any of the other substances discovered so far, and it is known to have no undesirable side-effects.

4962 CHENOTHERAPY FOR GALLSTONE DISSOLUTION. I. EFFICACY AND SAFETY. (Eng.) Thistle, J. L.; Hofmann, A. F.; Ott, B. J.; Stephens, D. H. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *JAMA* 239(11):1041-1046; 1978.

The results of chenodeoxycholic acid therapy for dissolving gallstones in 90 patients are reported, with particular attention to determinants of response. Of 12 patients receiving 15 mg/kg/day or more, 10 responded; only 15 of 40 patients receiving less than 15 mg/kg/day responded. Only 1 of 10 patients with large, solitary stones responded, while 14 of 30 patients with several stones responded. Of five patients in whom the gallbladder was repeatedly poorly visualized, none responded to therapy. Eighteen patients with radiopaque stones did not respond. Five of 10 patients with stones in the common bile duct responded. Small, dose-related elevations in SGOT were the only biochemical abnormality observed during treatment. Liver biopsy specimens showed no notable abnormality. Diarrhea was an infrequent problem. Stones recurred in 3 of 15 patients during 6 to 48 months of observation without treatment. Chenodeoxycholic acid, when given in adequate dosage, continues to appear promising as medical therapy for asymptomatic radiolucent gallstones in radiologically visualizing gallbladders.

4963 CHENOTHERAPY FOR GALLSTONE DISSOLUTION. II. INDUCED CHANGES IN BILE COMPOSITION AND GALLSTONE RESPONSE. (Eng.) Hofmann, A. F.; Thistle, J. L.; Klein, P. D.; Szczepanik, P. A.; Yu, P. Y. S. (Univ. Hosp., San Diego, CA 92103). *JAMA* 239(12):1138-1144; 1978.

Changes in bile saturation and biliary bile acid composition in patients with gallstones who received chenodeoxycholic (chenic) acid, cholic acid (both at 15 mg/kg/day for 1 yr), or placebo were determined using gas chromatography and mass spectrometry. Chenodeoxycholic acid induced bile desaturation; this effect was attributable solely to a decrease in the proportion of cholesterol. By gas chromatography, chenodeoxycholic acid increased substantially in the biliary bile acids of patients receiving it, and by mass spectrometry, no unusual bile acids were detected in appreciable amounts. Changes in bile saturation and biliary bile acid composition were then related to chenodeoxycholic acid dosage, and all of these variables were, in turn, related to gallstone response. In general, patients whose gallstones dissolved ingested a higher dose of chenodeoxycholic acid (or had bile that contained a higher proportion of this acid) and it was more unsaturated, but there were many exceptions, casting doubt on the value of a single analysis of fasting-state bile for predicting gallstone dissolutions. The major factor influencing response, provided dosage is adequate, appears to be gallstone type. Nonetheless, the proportion of chenodeoxycholic acid in biliary bile acids can probably be used to infer patient compliance.

4964 TREATMENT OF RESIDUAL COMMON DUCT STONES BY INTRACHOLEDOCHAL HEPARINIZED SALINE. (Ger.) Dromer, H. (Chirurgische Abteilung, Einheit Kreiskrankenhaus-Kreispoliklinik, Kothener Str. 13, DDR-33 Schonebeck Elbe, E. Germany). *Zentralbl. Chir.* 102(24):1501-1505; 1977.

Three patients cholecystectomized for cholelithiasis were treated with heparin (3 x 25,000 U/day in 20 ml isotonic saline solution) through a T-drain to dissolve residual stones in the common bile duct. The treatment was begun 6-7 days after surgery. Complete dissolution of the stones was observed cholangiographically. The patients are in good condition, without recurrence.

4965 CANCER RISK IN DIFFERENT TYPES OF GALLSTONES. (Ger.) Grosse, H. (Bezirkskrankenhaus-Prosektur, Billrothstr. 22, DDR-23, Stralsund, E. Germany). *Arch. Geschwulstforsch.* 47(8):710-718; 1977.

The cancer risk related to different types of gallstones was studied in a series of 22,868 adults autopsied in the Stralsund area during the 1945-1967 period. Cholelithiasis was found in 6,973 cases and evidence of cholecystectomy in 438. Malignant tumors were found in 1,256/4,680 women with gallstones; 241 of the tumors were gallbladder carcinomas. Malignant tumors were found in 611/2,293 men with gallstones; the tumors included only 37 gallbladder carcinomas. Regardless of the type of gallstone, carcinomas of the lungs, stomach, intestines, and prostate were more frequent than gallbladder carcinomas among the men with gallstones. Among women with pigment stones or primary cholesterol stones, cancers of organs other than the gallbladder were also more frequent than those of the gallbladder; but gallbladder carcinoma was the most frequent tumor in women with secondary gallstones (especially in those with secondary facetted gallstones), while gallbladder carcinoma was rare among women with cholesterol, pigment, or mulberry gallstones. In women, the incidence of gallbladder carcinoma increased with the increase in the partial volume of the gallstone and the incidence of cholecystitis.

4966 CHOLESTASIS: PUMP FAILURE, MICROVILLI DEFECT, OR BOTH? (Eng.) Erlinger, S. (Hopital Beaujon, 92118 Clichy Cedex, France). *Lancet* 1(8063):533-534; 1978.

A new hypothesis to explain cholestasis is offered as a result of a review of several experimental models (estrogen-, cytochalasin B-, and phalloidin-induced) of cholestasis. Bile formation involves active pumping of one or several solutes into the lumen of a channel. Cholestasis may be the consequence of either an alteration of the pumps (the systems responsible for solute transport: either the bile salt pump or the Na^+- and K^+-ATPase sodium transport system) or an alteration of the channels (as in the alteration of the canalicular microvilli

resulting from microfilament dysfunction). Evidence that both mechanisms operate is presented.

4967 JAUNDICE AND PERINATAL INFECTION. (Hun.) Fekete, M.; Vinceller, M.; Horvath, M. (Gyermekklinika, Pecsi Orvostudomanyi Egyetem, Pecs, Hungary). *Orv. Hetil.* 118(46):2751-2754; 1977.

The changes of the serum bilirubin level were studied in 174 full-term babies and 160 premature babies who suffered from perinatal infectious hepatitis or idiopathic hyperbilirubinemia during the first 3 weeks of postnatal life. Idiopathic hyperbilirubinemia was diagnosed in 110 premature and 92 full-term babies and perinatal infectious hepatitis in 50 premature and 82 full-term babies. The serum bilirubin level of the premature babies with infectious hepatitis was significantly higher ($p<0.01$) than that of the premature babies with hyperbilirubinemia during the first week of life, after which there was no significant difference. In full-term babies, perinatal infection was not accompanied by elevated serum bilirubin level. The findings suggest that the hyperbilirubinemia seen in perinatal infectious hepatitis and idiopathic hyperbilirubinemia is due to unknown, possibly identical, mechanisms in the two entities that are independent of the biochemical and functional maturity of the newborn babies.

4968 "PSEUDOSTONE" OF THE GALLBLADDER: ULTRASOUND FINDINGS AND CASE REPORT. (Eng.) McCune, B. R.; Weeks, L. E.; O'Brien, T. F., Jr.; Martin, J. F. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *Gastroenterology* 73(5):1149-1151; 1977.

A case report is presented to illustrate an artifact referred to as "pseudostone," in which all the diagnostic criteria for gallstones were fulfilled but in which gallstones did not exist. The ultrasonic criteria for the diagnosis of gallbladder calculi are (a) echo-dense structures that disturb the smooth contour of the posterior border of the gallbladder, (b) sonic shadowing, and (c) echoes from within the gallbladder. Diagnostic confidence increases greatly in cases in which internal echoes, contour irregularities, and sonic shadows have occurred simultaneously. Although all three criteria were met in the patient, the pseudostone phenomenon was confirmed by varying the patient's respiration and showing that the "pseudostone" represented echoes from a loop of bowel that produced a significant impression on the posterior wall of the gallbladder during deep inspiration. The absence of cholelithiasis was confirmed by oral cholecystography. The confirmation of ultrasound diagnosis by direct multiple visualizations of a defect combined with the demonstration of the persistence of the defect with different phases of respiration is essential in differentiating true gallstones from pseudostones.

4969 PLASTIC SURGERY IN STRICTURES OF THE COMMON BILE AND HEPATIC DUCTS. (Rus.) Gal'perin, E. I.; Kuzovlev, N. F. (Dept. Clinical and Experimental Liver Surgery, Inst. Transplantation of Organs and Tissues, Moscow, USSR). *Khirurgiia* (1):63-72; 1978.

The results of the surgical treatment of 85 patients with recurrent cicatrical strictures of the common bile and hepatic ducts are presented. The majority of the patients had a history of three to four unsuccessful plastic operations on the bile ducts. Fifty-seven patients had prolonged jaundice, 24 had cholangitis, and 17 had complete external biliary fistula. Stricture of the common biliary duct was recorded in 32 patients and high cicatrical stricture was detected in 53 patients. Surgery included dissection of the strictures with formation of the bilio-biliary anastomosis (10 patients, 4 developed recurrences), bougienage of the low stricture (3 patients, 1 died, and 1 developed recurrence), bougienage of the high stricture (4 patients, 2 developed recurrence), formation of various bilio-digestive anastomoses (44 patients who underwent hepaticojejunostomy of whom 6 developed recurrence; 3 patients who underwent hepaticoduodenostomy of whom all developed recurrence), and thorough transhepatic drainage (35 patients).

4970 ORAL CHOLECYSTOGRAPHY. INDICATIONS, COUNTERINDICATIONS AND ABSENCE OF OPACIFICATION. (Fre.) Nahum, H.; Girault, M. J. (Hopital Beaujon, 100, boulevard du General Leclerc, 92110 Clichy, France). *Rev. Prat.* 27(22):1403-1404; 1977.

4971 INDICATIONS AND RELEVANCE OF PERORAL AND INTRAVENOUS CHOLEGRAPHY. (Ger.) Freitag, J.; Mokros, W.; Freitag, G.; Bartels, F.; Schenk, E. (Radiologischen Klinik der Medizinischen Akademie Magdeburg, Leipziger Str. 44, DDR-301 Magdeburg, E. Germany). *Dtsch. Gesundheitsw.* 32(15):694-699; 1977.

4972 DIAGNOSTIC SIGNIFICANCE OF IDENTIFICATION OF ALKALINE PHOSPHATASE, HISTIDASE AND UROKANINASE IN THE BILE IN DISEASES OF THE HEPATOBILIARY SYSTEM IN CHILDREN. (Rus.) Zernov, N. G.; Epikhin, N. V. (Dept. Pediatrics, Moscow Medical Inst. Stomatology, Moscow, USSR). *Pediatriia* (3): 56-59; 1977.

4973 OPERATIVE DIAGNOSIS OF DISEASES INVOLVING BILE PASSAGES BY MEANS OF ROENTGEN-TV CHOLANGIOGRAPHY. (Rus.) Pantsyrev, Yu. M.; Ryabov, V. I.; Savrasov, V. M. (Clinic Hosp. Surgery and Anesthesiology, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (3):85-90; 1977.

4974 ULTRASONIC METHODS IN THE DIFFERENTIAL DIAGNOSIS OF POSTCHOLECYSTECTOMY SYNDROME.

(Ger.) Braun, B.; Schwerk, W. (Med. Poliklinik der Universitat, Robert-Koch-Strasse 7a, D-3550 Marburg/Lahn, W. Germany). *Munch. Med. Wochenschr.* 119(29/30):975-978; 1977.

4975 USE OF CHOLECYSTOKININ-PANCREOZYMIN FOR THE TREATMENT OF SOME DISEASES OF THE PANCREATIC-BILIARY SYSTEM. (Rus.) Darmostuk, V. Yu. (Clinic Hepatic and Pancreatic Diseases, Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo* (5): 28-32; 1977.

4976 EXPERIENCE WITH THE PANCHELIDON TREATMENT OF BILIARY TRACT DISEASES. (Ger.) Neumann-Mangoldt, P. (Maximilianstrasse 6, 8130 Starnberg, W. Germany). *Med. Welt* 28(4):181-185; 1977.

4977 COMPLICATIONS OF CHOLECYSTECTOMY IN THE ELDERLY. (Rus.) Antonenkov, G. M.; Kochiashvili, V. I.; Beliaev, M. P. (Dept. Surgery and Topographic Anatomy, Moscow N. A. Semashko Inst. Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (3):111-113; 1977.

4978 LONG-TERM RESULTS OF SURGERY INVOLVING CHOLEDOCHODUODENOSTOMY. (Rus.) Filimonov, M. I. (S. I. Spasokukotskii Dept. Surgery, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):119-123; 1977.

4979 CONGENITAL DILATATION OF THE CHOLEDOCHUS OR COMPLICATION OF RESECTION OF THE SPHINCTER OF ODDI. (Fre.) Vignal, J.; Lamerant, P. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(4):302-304; 1977.

4980 INTERNAL DRAINAGE IN BILE DUCT SURGERY. (Rus.) Toskin, K. D.; Belomar, I. D.; Khaikin, Ya. B.; Zhebrosky, V. V.; Starosek, V. N. (Surgical Clinic, Crimean Medical Inst., Crimea, USSR). *Khirurgiia (Mosk.)* (3):22-26; 1977.

4981 ACCIDENTAL INJURY OF THE HEPATIC ARTERY, PORTAL VEIN, AND HEPATIC BILE DUCTS DURING SURGERY. (Rus.) Tabakov, A. I. (First Dept. Surgery, M. Gor'kii Zaporozh'e Inst. Advanced Medical Studies, Zaporozh'e, USSR). *Vestn. Khir.* 118 (5):123-127; 1977.

4982 ROLE OF THE DUODENUM IN BILIOPANCREATIC LESIONS. (Ita.) Berti Riboli, E.; Reboa, G.; Mortola, G. P. (Istituto Clinica Chirurgica Generale e Terapia Chirurgica, Univ. Genova, Genova, Italy). *Minerva Gastroenterol.* 23(1):35-36; 1977.

4983 PARIETAL DIGESTION IN CHRONIC DISEASES OF THE BILIARY TRACT AND THE LIVER. (Rus.) Danovsky, L. V. (Second Dept. Pediatrics, V. I. Lenin Kazan Inst. Advanced Medical Studies, Kazan, USSR). *Ter. Arkh.* 49(2):55-60; 1977.

4984 HUMORAL CHANGES IN BILIARY TRACT DISEASES ASSOCIATED WITH GASTRITIS. (Rus.) Kiriliuk, N. A.; Loboda, N. I.; Lukianchuk, D. G. (Propedeutic Dept. Internal Medicine, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (3):27-30; 1977.

4985 BOUVERET'S SYNDROME (PYLORODUODENAL OBSTRUCTION DUE TO BILIARY CALCULUS): REPORT OF A NEW CASE. (Fre.) Meyer, C.; Keller, D.; Hollender, L. F. (Centre Hospitalier Universitaire, 67005 Strasbourg Cedex, France). *Lyon Chir.* 73(4): 299-301; 1977.

4986 CLINICAL AND THERAPEUTIC CONSIDERATIONS ON PRIMARY MALIGNANT TUMORS OF THE TERMINAL BILE DUCT. (Ita.) Rocco, B. (Istituto di Patologia Chirurgica e Propedeutica Clinica, Universita di Siena, Siena, Italy). *Arch. Ital. Chir.* 100(2):211-215; 1977.

4987 ASSOCIATION OF PORCELAIN GALLBLADDER WITH DIGESTIVE TRACT CANCER [Letter to Editor]. (Fre.) Germain, M.; Martin, E.; Gremillet, C. (Hopital Antoine Beclere, 157, rue de la Porte de Trivaux, F 92140 Clamart, France). *Nouv. Presse Med.* 6(16):1393; 1977.

4988 BENIGN GALLBLADDER TUMORS. (Ita.) Nicoletta, G.; Muliere, P. (Ospedale Provinciale "San Carlo," Divisione Chirurgica, Potenza, Italy). *Minerva Med.* 68(3):191-196; 1977.

4989 POTENTIALS OF THE ROENTGENOLOGICAL METHOD IN THE DIAGNOSIS OF AN "EXCLUDED" BLADDER. (Rus.) Markvarde, M. M.; Sergeeva, I. I.; Rozhkovskaya, V. V.; Zhevnova, T. I. (Dept. Roentgenology, Minsk Medical Inst., Minsk, USSR). *Khirurgiia (Mosk.)* (3):31-34; 1977.

4990 THE IMPORTANCE OF SOME BIOCHEMICAL BILE CHARACTERISTICS IN DIAGNOSING CHRONIC CHOLECYSTITIS. (Rus.) Masevich, Ts. G.; Tsykin, D. B.; Ignatova, N. Z. (Propedeutic Dept. Internal Medicine, Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Sov. Med.* (2):60-63; 1977.

4991 CALCULOUS CHOLECYSTITIS. SOME PATHOGENETIC AND DIAGNOSTIC PROBLEMS. (Rus.) Galkin, V. A. (Dept. Therapeutic Propedeutics, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):55-60; 1977.

4992 LAPAROSCOPY IN THE DIAGNOSIS AND TREATMENT OF ACUTE CHOLECYSTITIS AND PANCREATITIS.

(Rus.) Yukhtin, V. I.; Lyubsky, A. S.; Chadaev, A. P.; Sacka, A. A. (Dept. General Surgery, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (3):10-14; 1977.

4993 THERAPEUTIC TACTICS IN ACUTE CHOLECYSTITIS. (Rus.) Moroz, I. M. (Dept. Therapy, Lvov Medical Inst., Lvov, USSR). *Khirurgiia (Mosk.)* (3): 26-31; 1977.

4994 COMPLEX TREATMENT OF PATIENTS WITH ACUTE CHOLECYSTITIS AND PANCREATITIS COMPLICATED BY HEPATIC INSUFFICIENCY. (Rus.) Sulima, S. Ya.; Kovtun, M. I. (Dept. Surgery, Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Klin. Khir.* (2):34-37; 1977.

4995 TREATMENT OF PATIENTS WITH ACUTE CHOLECYSTITIS. (Rus.) Skripnichenko, D. F.; Mamchich, V. I. (First Dept. Surgery, Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Klin. Khir.* (2):38-41; 1977.

4996 TREATMENT EFFICIENCY OF PATIENTS WITH CHRONIC CHOLECYSTITIS AT THE "SHAYAN" HEALTH RESORT. (Rus.) Marksiti, L. T.; Torokhtin, M. D.; Kozachenko, R. Ya.; Bygova, L. M.; Lendiel, M. F.; Siksai, P. S. (Uzhgorod Branch, Odessa Scientific Res. Inst. Balneology, "Shaian" Sanitorium, Uzhgorod, USSR). *Vrach. Delo* (3):43-45; 1977.

See also, 4423, 4441, 4485, 4556, 4558, 4561, 4562, 4563, 4564, 4565, 4566, 4568, 4569, 4579, 4588, 4592, 4595, 4600, 4602, 4677, 4704, 4719, 4782, 4800, 4806, 4808, 4810, 4839, 4853, 4854, 4922, 5023, 5028, 5038, 5043, 5052.

GENERAL

4997 CHANGES IN THE EXOCRINE FUNCTION OF THE PANCREAS IN RELATION TO ANESTHESIA AND SURGERY. (Rus.) Rusakov, V. I.; Parsieva, A. I. (Dept. Surgery, Rostov Medical Inst., Rostov, USSR). *Anesteziol. Reanimatol.* (2):70-73; 1977.

The effect of anesthesia on the exocrine function of the pancreas was studied in 41 patients who underwent surgery for urethral stricture. Group 1 (10 patients) received endotracheal fluothane anesthesia, group 2 (13 patients) neuroleptanalgesia with fentanyl, and group 3 (18 patients) received ether anesthesia. The serum amylase, lipase, trypsin, and trypsin inhibitor levels were determined before, immediately after, and 1-7 days after anesthesia. Fluothane anesthesia caused a marked increase in the serum amylase (17.7% versus 14.9%), lipase (51 mU versus 18.6 mU), and trypsin (4.1 mU versus 2.9 mU) levels and a marked reduction of the trypsin inhibitor level (252.9 mU versus 357.3 mU) immediately after the anesthesia. The enzyme levels did not normalize completely in 7 days. Neuroleptanalgesia did not cause significant changes in the enzyme levels. Ether anesthesia strongly inhibited all enzymes, especially lipase (its level dropped to 0), and decreased the trypsin inhibitor level. The response of the pancreas to anesthesia is dependent on the type of anesthesia administered.

4998 ENTEROTOXIN ANTIBODIES IN RELATION TO DIARRHOEA IN SWEDISH SOLDIERS IN CYPRUS. (Eng.) Svennerholm, A. M.; Back, E.; Holmgren, J. (Univ. Gothenburg, Gothenburg, Sweden). *Bull. W.H.O.* 55(6):663-668; 1977.

The development of antibodies to *Escherichia coli* heat-labile enterotoxin (LT) and its relation to diarrhea was studied in two Swedish battalions, one in the winter (WB, 560 men) and one in the summer (SB, 450 men), in Cyprus. Whereas only 6-15% of the soldiers had detectable levels of anti-LT antibodies in their sera before leaving Sweden, as many as 69% of the SB and 43% of the WB soldiers who developed diarrhea in Cyprus acquired significant titers of enterotoxin antibodies in their sera (acute phase serum). During the summer, many soldiers without diarrhea also obtained anti-LT antibodies, whereas no such response was observed in healthy soldiers during the winter. Civilian Turkish Cypriots had positive sera in high frequency (60-66%) during both study periods. Parallel titration of positive sera against *E. coli* LT and cholera toxin indicated that the enterotoxin-neutralizing antibodies registered were induced by bacteria producing enterotoxin identical or closely related to LT.

4999 COLONIC STENOSIS AND ATRESIA FOLLOWING NEONATAL NECROTISING ENTEROCOLITIS. (Eng.) Schafer, J.; Young, D. G. (Royal Hosp. Sick Children, Yorkhill, Glasgow G3 8SJ, Scotland). *Z. Kinderchir.* 22(2):145-152; 1977.

5000 MASSIVE UPPER GASTROINTESTINAL HEMORRHAGE IN THE ELDERLY. (Eng.) Chang, F. C.; Drake, J. E.; Farha, G. J. (Univ. Kansas Sch. Medicine--Wichita, Wichita, KS 67214). *Am. J. Surg.* 134(12):721-723; 1977.

5001 LONG-TERM RESULTS OF RECTOSIGMOIDECTOMY FOR INTRACTABLE CHRONIC CONSTIPATION (IDIOPATHIC MEGACOLON). (Eng.) Ehrenpreis, Th.; Livaditis, A. (Ljuskarrsv 92, S-13300 Saltsjobaden, Sweden). *Z. Kinderchir.* 22(3):280-285; 1977.

5002 NECROTIZING ENTEROCOLITIS. (Eng.) Drablos, P. A.; Bjordal, R.; Bolle, R.; Borgnes, J.; Langmark, F.; Knutrud, O. (Rikshospitalet, Oslo 1, Norway). *Z. Kinderchir.* 22(3):260-266; 1977.

5003 ACUTE GASTRO-ENTERITIS (A CLINICAL AND BACTERIOLOGICAL STUDY). (Eng.) Chugh, S. K.; Gupta, S. M.; Misra, R. C.; Ray, B. G. (Maulana Azad Medical Coll., New Dehli, India). *J. Indian Med. Assoc.* 69(3):49-51; 1977.

5004 THE ROLE OF THE LIVER IN THE CHANGES OF ACID-BASE BALANCE AND PLASMA LIPIDS DURING SURFACE-INDUCED DEEP HYPOTHERMIA. (Eng.) Shida, H.; Morimoto, M.; Inokawa, K.; Tsugane, J. (Faculty Medicine, Shinshu Univ., Matsumoto, Japan). *Jpn. J. Surg.* 7(3):139-146; 1977.

5005 MANAGEMENT OF GASTROENTERITIS IN EARLY CHILDHOOD. (Eng.) Holdaway, M. D. (Univ. Otago Medical Sch., P.O. Box 913, Dunedin, New Zealand). *Drugs* 14(5):383-389; 1977.

5006 THERAPEUTIC EMBOLIZATION WITH LONG-TERM OCCLUDING AGENTS AND THEIR EFFECTS ON EMBOLIZED TISSUES. (Eng.) White, R. I., Jr.; Strandberg, J. V.; Gross, G. S.; Barth, K. H. (Johns Hopkins Medical Inst., Baltimore, MD 21205). *Radiology* 125(3):677-687; 1977.

5007 SUBMANDIBULAR AND MINOR SALIVARY GLAND CARCINOMA: A 15-YEAR REVIEW. (Eng.) McGregor, G. I.; Robins, R. E. (750 W. Broadway, Vancouver, British Columbia, Canada). *Am. Surg.* 43(11):737-742; 1977.

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GENERAL

Parasitology

5049 AMEBIC LIVER ABSCESS: 1966-1976. (Eng.) Shabot, J. M.; Patterson, M. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Dig. Dis.* 23(2):110-118; 1978.

A 10-yr retrospective analysis of 15 patients with amebic liver abscess is reviewed and represents a continuation of the previous 2-decade experience at one institution (37 patients). Records were studied to determine the population affected, presenting symptoms, physical and laboratory findings, and type of and response to therapy. Most patients were rural men of lower socioeconomic status in the third to fifth decade of life. They presented with a febrile illness with abdominal pain for an average of 2.5-months duration. The chief physical abnormalities were tender hepatomegaly (93%), right-sided pulmonary changes (40%), anorexia (80%), weight loss (mean, 24 pounds; 66%), and fever (66%). All patients had abnormal liver scan, positive amebic serology, and hypoalbuminemia (1.7-2.9 g/100 ml). All patients promptly responded to amebicidal therapy except one whose therapy was delayed. Clinical suspicion, liver scanning, serologic testing, and response to therapy are the keys to diagnosis.

5050 BACTERIAL COLONIZATION OF JEJUNAL MUCOSA IN GIARDIASIS. (Eng.) Tomkins, A. M.; Wright, S. G.; Drasar, B. S.; James, W. P. T. (Hosp. for Tropical Diseases, London, WC1, England). *Trans. R. Soc. Trop. Med. Hyg.* 72(1):33-36; 1978.

The jejunal flora of 14 patients with giardiasis and severe malabsorption were investigated to determine whether the latter represented an extreme form of giardiasis alone or resulted from additional contamination by enterobacteria. Nine of the 14 cases were found to have numerous bacteria adjacent to the mucosa and within luminal fluid samples from

the upper jejunum. Three species of enterobacteria (*Klebsiella pneumoniae, Enterobacter cloacae,* and *E. Hafniae*) were cultured from eight patients. *Bacteroides* were isolated from only one patient. Enterobacteria were not cultured from seven of eight patients who had giardiasis but only mild malabsorption (of xylose only) or from seven patients with giardiasis without malabsorption. Intestinal colonization by enterobacteria may make an important contribution to the development of malabsorption in patients with giardiasis.

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5057 TREATMENT OF GIARDIASIS WITH TINIDAZOLE. (Eng.) El Masry, N. A.; Farid, Z.; Miner, W. F. (U.S. Naval Medical Res. Unit No. 3, FPO, NY 09527). *Am. J. Trop. Med. Hyg.* 27(1):201-202; 1978.

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GENERAL

Regional Enteritis

5058 EARLY LESIONS OF CROHN'S DISEASE. (Eng.) Laufer, L.; Costopoulos, L. (Univ. Pennsylvania Hosp., 3400 Spruce St., Philadelphia, PA 19104). *Am. J. Roentgenol.* 130(2):307-311; 1978.

Early lesions of Crohn's disease, visualized by double contrast techniques in the colon, small bowel, and stomach, are described. The aphthoid ulcers produce a "bull's-eye" or "target" lesion consisting of a small central collection of barium surrounded by a radiolucent halo due to the granulomatous inflammation. The appearance is identical in the colon, small bowel, and stomach. The early lesions may be seen adjacent to or at a distance from a segment of more severe disease. In some patients, only these early lesions are found. The radiologic demonstration of these aphthoid ulcers for early diagnosis, facilitates differentiation between ulcerative and granulomatous colitis, and is important for planning appropriate therapy.

5059 REGIONAL ENTERITIS IN MONOZYGOUS TWINS. REPORT OF AN 11th CASE AND REVIEW OF THE LITERATURE. (Fre.) Morichau-Beauchant, M.; Matuchansky, C.; Dofing, J. L.; Yver, L.; Morichau-Beauchant, J. (Service de Gastroenterologie, Hotel-Dieu, F 86021 Poitiers, France). *Gastroenterol. Clin. Biol.* 1(10):783-788; 1977.

Crohn's disease was diagnosed in 32-yr-old monozygous twin brothers who had been living apart for the last 10 yr before the onset of the disease. This case is compared with 10 previously reported cases, and some new data are presented. No karyotype abnormalities, immune deficiency, or genetic diseases were found, while the "null" (non B, non T) lymphocyte count was increased in both cases. The role of common environmental factors appears limited, but cannot be ruled out completely. Genetic factors appear to have played a major role in these cases of familial Crohn's disease.

5060 RESPONSE TO SPECIFIC DRUG THERAPY IN CROHN'S DISEASE; EVALUATION BY RECTAL BIOPSY AND MUCOSAL CELL COUNTS [Abstract]. (Eng.) Korelitz, B. I.; Sommers, S. C. (Lenox Hill Hosp., New York, NY). *Gastroenterology* 72(5, Part 2):1083; 1977.

5061 EVALUATION OF METRONIDAZOLE IN THE MANAGEMENT OF CROHN'S DISEASE [Abstract]. (Eng.) Allan, R.; Cooke, W. T. (General Hosp., Birmingham, England). *Gastroenterology* 72(5, Part 2):1024; 1977.

5062 BREAKFAST AND CROHN'S DISEASE [Letter to Editor]. (Eng.) Thomas, B. J.; Jarrett, R. J.; Keen, H. (Guy's Hosp., London SE1, England). *Br. Med. J.* 2(6087):641; 1977.

5063 CROHN'S DISEASE IN THE URBAN NEGRO [Abstract]. (Eng.) Greene, C. C.; Bayless, T. M. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Gastroenterology* 72(5, Part 2):1065; 1977.

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5065 CROHN'S DISEASE IN ADOLESCENTS: LONGTERM ALTERNATE DAY PREDNISONE THERAPY [Abstract]. (Eng.) Bayless, T. M.; Whitington, P. F.; Barnes, H. V. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Gastroenterology* 72(5, Part 2): 1028; 1977.

5066 INTESTINAL MICROFLORA IN PATIENTS WITH CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Levitan, M. Ch.; Marco, O. P. (Res. Proctological Lab. with Clinic, Ministry Health, Moscow, USSR). *Am. J. Proctol.* 27(6):49-54; 1976.

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NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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★U.S. GOVERNMENT PRINTING OFFICE: 1979—281-227:6

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MD. 20014

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DHEW Publication No. (NIH) 79-66